American Machinist

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THE LONG VIEW

FORTUNATE is the man with an ever-widening market for his services, doubly fortunate the industry. A quick and wholly unstatistical glance at the evolution of the metal-working industry gives proof enough that its market has expanded and will continue to expand in arithmetical and even geometrical progression. In the long view, it is the favored of all industries, and *American Machinist* is grateful to be able to serve it.

Consider the blacksmith at his forge. Not many centuries ago he might have said with reason that horse shoes were his ultimate market. Though the blacksmith is just as useful and expert today as he ever was, let us not forget that from him has evolved the whole procession of workers in metal who constitute the metal-working industry of yesterday, today, and tomorrow. Meager as the business totals of 1930 may seem to be, think back to 1920, 1900, 1880, 1860. Think ahead to 1940 and 1950.

The less said about 1930 for the present, the better. Rather than review a year whose upsets and misfortunes are still too personal and too recent to be discussed objectively, the editors of *American Machinist* have decided to devote a substantial portion of this issue to presenting opportunities that lie outside the beaten path. They will continue to seek out and present other opportunities in other issues. Were they inclined to ballyhoo and bluster, they might go so far as legitimately to entitle it an "Opportunity Number."

Though it may be regarded as essentially that, the editors hope that this first issue of a new volume will be read with an open mind. You may be a manufacturer of stampings and have seen your automotive market slip. What can you find to replace it, perhaps to displace it? Have you considered the architectural market? You may be a screw machine operator and have seen your day's work transferred to forming presses. What work can you find in the electrical industry? Or you may be a foreman out of work, a leader of men without men to lead. Does your opportunity await you in managing the workmen who are mechanizing the chemical industry?

The long view is vital. The extraordinary of today becomes tomorrow's commonplace. It is hoped that every reader, executive or operative, will find at least one thing herein to fire his imagination and assist him in finding constantly broadening fields for his activities.

K. H. Condit

Publishing Director.

Soon to arise in Chicago, an all-metal apartment house by Bowman Brothers, Architects

Courtesy the Architectural Record

OPPORTUNITIES IN ARCHITECTURE

The basic modern material for building is metal

PREHISTORIC man crouched shivering in his primordial home atop a tree. Lightning flashed, wintry winds roared. Man blew on his cold fingers as he clutched the branchy floor with his prehensile bare toes. Said he to his companionate mate, "This place is far too drafty. I'm going to build us a nice warm hut."

To that immemorial day do we trace the nativity of architecture, earliest and noblest of the arts, newest field of opportunity for the worker in metal.

True enough, the metal worker has probably had his skillful hand in architecture and building construction since the day that metal was discovered, but largely in an auxiliary way. Metal ornaments, metal hardware can be found in almost any ancient edifice; metal tools must perforce have been used in the construction of almost any building today existent.

Not, however, until recent years has the metal worker come into his own. Though metal plumbing is as old as Rome, it's more universal use came during the nineteenth century. The building with skeleton framework of metal is definitely modern. As long as one cares to make it, is the list of conventional architectural uses

Keystone

Even when a Navy blimp is not trying to moor, blasé metropolites stop to admire the Empire State Building

for metal—structural members, pipe, heating and plumbing equipment, storage tanks, roofing, doors, window frames, hardware, ornaments—forgings, castings, stampings, fashioned and finished in accord with the moods and vogues of the changing years.

Now, just around the corner is the all-metal building—not all-steel or all-bronze or all-aluminum or even all-beryllium, but all metal. Each metal or alloy of metals will find its place in the economies and necessities of the modern structure, in the tastes of its architects and builders.

As charity should, the all-metal building very probably began at home. In 1890, Neils Poulson built an almost all-metal house in Brooklyn, N. Y. With walls of copper, copper-riveted to steel uprights, this venerable house resisted the elements until its dismantling in 1930. Its undamaged wallpaper disclosed the tight protection afforded against the storms of forty years.

As did the airplane, all-metal construction left its native shores for a period of nurturing and development in Europe. "Die Stahl Kirche," which should be all-steel to be consistent, is none the less a combination copper, steel, bronze, glass, concrete, and wood landmark in Cologne, Germany. Throughout Europe, countless metal homes and business buildings are in progress or in prospect. At last, metal construction comes home. In unregenerate Chicago, an all-metal apartment building is well on its way.

Aesthetically and economically, the all-metal building is an assured success. Shall the builder wish his home or factory to embody the economies of the enhanced usable areas afforded by metal construction, he may still preserve conventional architectural forms with simulated wood and stone and brick. Shall he, on the other hand, desire economy and modernity combined, the sky is the limit, figuratively and in truth. Compare outside metal walls 2-in. thick with 14-in. masonry. It should be clear that for each running foot, a square

Doorway of the first American all steel and glass building which houses the executive offices of the Worcester Pressed Steel Company and the Museum of the John Woodman Higgins Armory

Keystone

foot of usable or rentable area will be gained on each floor. In the Chicago building it has been shown by *The Architectural Record* that a proportional additional rentable area will increase the net income of the building by 14 per cent. And the metal walls will cost less.

The mass production of small, frame houses has developed within recent years to the point where mail-order houses are doing a large business in ready-made, cut-to-fit dwellings. All parts are factory-made according to catalog plans; nothing remains but assembly on the building site. Thus far, these are non-metal houses.

The same principle can be applied to metal structures and will be. Already a mid-western architect has conceived the plans for a house of metal which would be built in complete units by mass production and assembled according to a variety of patterns to suit the purchaser. An entire bathroom cast integrally sounds fantastic—but is it?

In the new skyscrapers of our larger cities the use of metal has come in strongly as a practical new practice. The metal-clad top of the Chrysler building gleams above the lesser Alps of Manhattan, and the tallest building in the world, the Empire State, now nearing completion in New York City, adds several cubits to its apparent stature by virtue of the narrow strips of mirror-like metal that plate its sides from base to mooring mast.

There would appear to be no reason why metal sheets and shapes could not be fabricated on a production basis to fit the needs of builders and architects. Once the advantages of metal as a building material become thoroughly recognized, as is fast happening, it will remain only for metal-working manufacturers to call in the aid of architects and establish definite specifications for sizes, shapes, and characteristics of metal building parts that will be most feasible for interchangeability in assembly.

The next step is to fabricate all-metal buildings sectionally in factories, complete, and assemble them on the job. Revolutionary but inevitable.

Let this article stop right here. It is neither its province nor its purpose to point out applications. Many a metal-working manufacturer has overstayed his market—seeks new products, new fields; many a skilled operative is on the street. Though architecture is almost as old as time itself, it is perennial. As long as man will need shelter, man will be forced to architecture. It will pay any executive or operative to investigate open-mindedly the opportunities waiting for him today in all-metal building construction. The amplitude of the market for goods or services may vary from year to year, but the market will always be there for those who are most alive to it.

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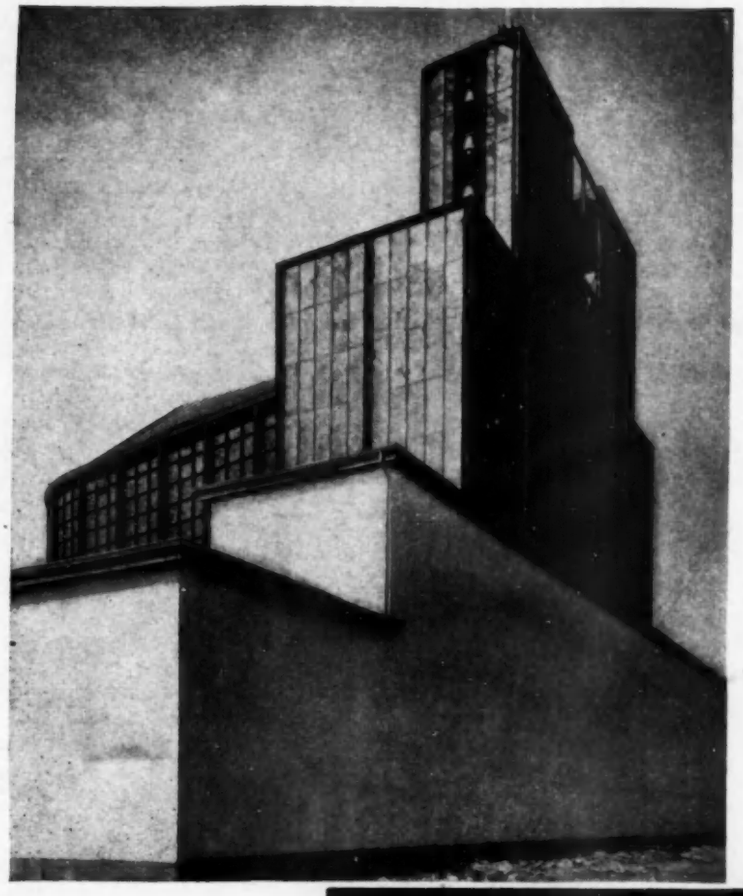
Keystone

The steelclad spire of the Chrysler Building reminds millions daily that a new architecture is here



Die Stahl Kirche of Hamburg, Germany. Steel in frame and name, this church is sheathed and roofed with copper

Courtesy Copper and Brass Research Association

Epicurus will take to the air. A restaurant building of steel and glass and aluminum to be built on a slender steel shaft and revolved twice hourly at a height of twenty-five stories above the Chicago World's Fair

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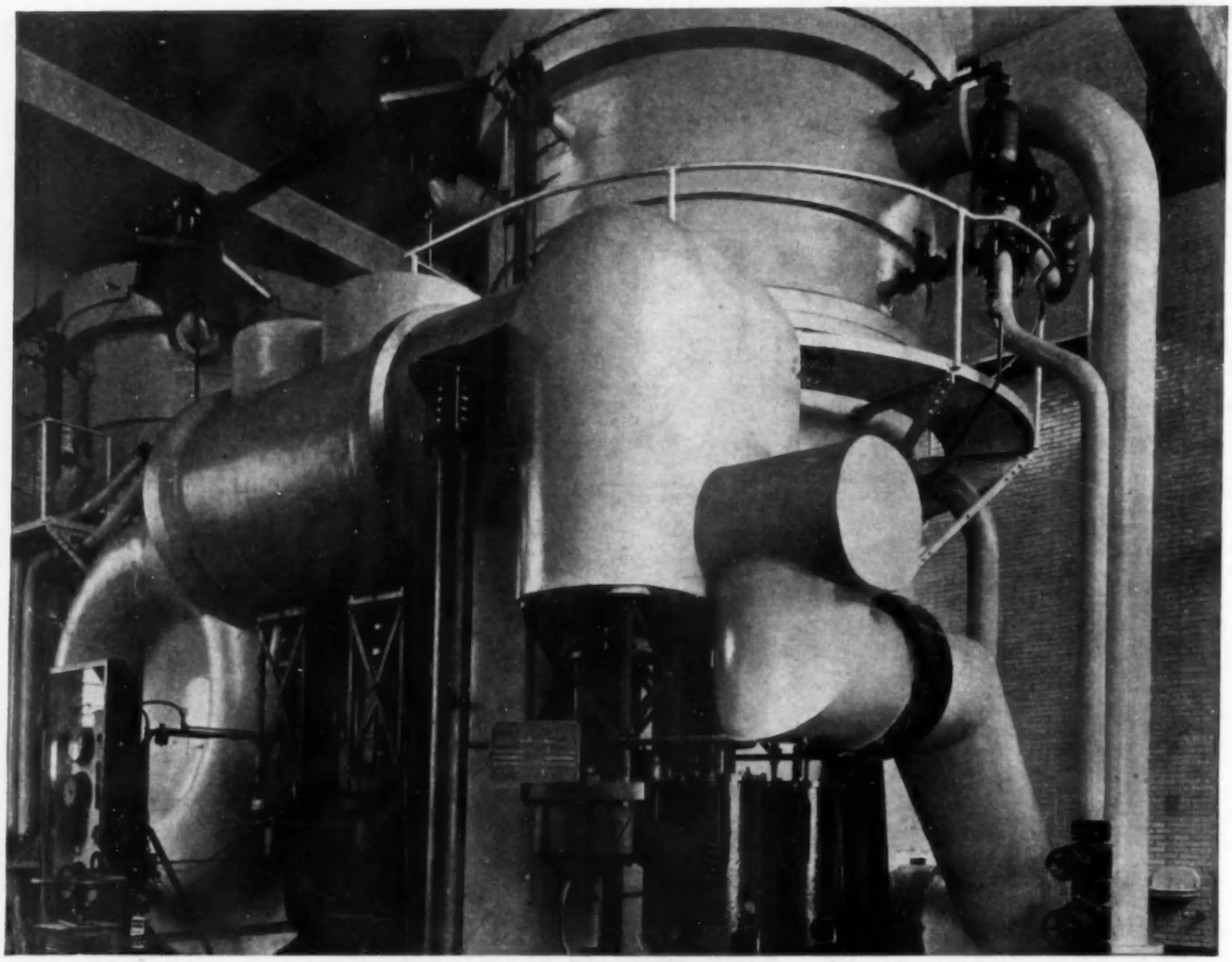


A new departure in power production, the binary-vapor turbine at South Meadow Station, Hartford (Conn.) Electric Light Company

ELECTRIFICATION and E

NOW THAT the world is temporarily convinced that gambling is wrong, and that the little pill is not under any of the three shells, it is time to take inventory of what the world really possesses. In particular, let us see just what electricity and electronics can do right now for the metal-working industry.

After all, economic crises have come and gone periodically ever since Joseph peddled wheat in Egypt; so far as history records, no nation or people has ascribed the crisis to any fault of its own. In early times it was the malign gods that were responsible, then an unpopular ruler or parliament, still later Wall Street, and now it is mechanization. The important thing is that depressions recur, and that they will continue to recur until we have either learned to balance a pyramid on its apex, or learned that it cannot be done.

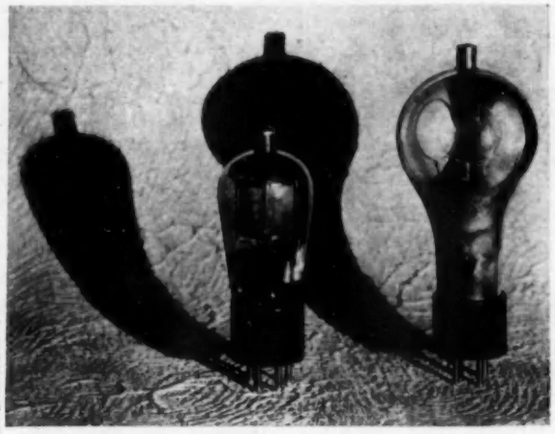
We usually forget that after each depression, the peak of the cycle that follows is higher than the one which precedes it. It will be so in the present cycle. As a result of research and subsequent development, the technique of the metal-working industries will, during the next ten years, change so radically that our present methods will seem archaic. This will not only be true in a mechanical sense, but in a management sense also. All the essentials for the revolution are ready and have been proved experimentally. The only way to judge the future is by the past, and a record of what has been accomplished to a limited degree during the past year or so is a definite index of what may be expected in the year to come.

Two items alone, the electronic power tube and the photo-electric cell, seem destined to revolutionize industry beyond any previous conception. Add to these new power sources, the transmission of many times as much direct current as alternating current over the identical wires, new means of transforming energy without loss, double thermal-cycle turbines that use cheaper primary fluids than mercury, new types of motors, built-in light-

ing, and sun-ray lamps, and we begin to see the far-reaching effect electricity and electronics will have on industry generally.

As far as the metal-working industry itself is concerned, these developments mean new types of machines, new drives, new alloys and cutting materials, extension of autogenous welding and hydrogen-atmosphere welding and brazing, and dozens of other developments. Since all of these are dependent upon equipment made directly either of metals or of materials requiring metal equipment for their manufacture, some idea of the possibilities in the immediate future may be envisioned. The union of metal-working and electricity is complete; without metals there can be no electricity, no electronics—without them, there can be but few machines. It is, therefore, meet that we survey in some detail these electrical developments. Any metal-working executive or operative can draw his own conclusions.

Among specific items is the application of the photo-electric cell to controlling mechanisms, a sensitive and positive means of control of any device from the regulation of lighting to the control of huge units of mill machinery. Imagine the crane man in a steel mill pointing his flashlight at a bulls-eye and opening the doors of a soaking pit or furnace. It seems incredible, but it is exceedingly simple and is actually being done. It means a revolution in control methods. The temperature of steel and its rolling are being controlled in the same manner. With this lamp, an optical pyrometer will not only indicate temperature, but will also control it.



"Radio" and photo-electric tubes stand side by side in the new field of electronics

ELECTRONICS

are changing the methods and the markets of the

METAL-WORKING WORLD

Notwithstanding the great variety of motors already on the market, there has been a persistent demand for highly specialized ones for special machine application, and this demand will continue. Another entirely new and revolutionary development will be the air-conditioning of cars, residences, and business offices. Cars on more than one railroad are already thus equipped, as are many factories. It is much easier and cheaper to cool a house or factory from 90 to 70 deg. F. than it is to heat it from 30 to 70 deg. Just as air conditioning has made weaving possible in the South so will it make living in the South popular.

The use of the electric arc for fabricating buildings is but a step in advance of the use of mill-fabricated interlocking members that require no welding or fastening of any kind on the job, the weight of the building itself locking all joints. As important is the welding of machines and equipment.

Just as great a revolution is due in railway operation. It is no longer considered that a hundred miles constitutes a day's work for a train crew, and the division terminals between which locomotives run are being further separated. Under the conditions within which railroads operate there is no chance of more economical handling of freight by reducing the train crew, and all that remains is to increase the train load. The ultimate answer is total electrification, including automatic electrical control. The Pennsylvania Railroad is undertaking "one of the most decisive electrical developments ever undertaken by any railroad." Anyone who has watched the improvements along the Hudson River cannot doubt that the New York Central contemplates a similar project.

Where this electrification cannot be done immediately, larger locomotives are being built. One recently delivered to the Northern Pacific weighed 1,116,000 lb. and was of the single-expansion type. Compounding of steam on locomotives has practically been abandoned; this means many new locomotives.

Other railroads have turned to gasoline-electric or Diesel-electric power for economy. Some of these locomotives are built to weigh as much as 650,000 lb., and develop 1,350 hp. at 800 r.p.m. Straight Diesels are also being used. One weighing 195,000 lb. uses the heat of combustion to raise a 200-lb. steam pressure in an auxiliary boiler used as a booster.

Other means beside electrification are being tried in order to reduce railroad operating costs. The steam locomotive is very inefficient. It burns entirely too much coal and exhausts at too high a pressure. Pulverized coal is one method being tried, steam turbines another. Higher steam pressure with partial condensing is still another. One locomotive built in Germany uses a steam pressure of 1,700 lb. per sq.in., and operates on the double thermal-cycle principle.

Extension of the turbo-electric drive from the battle-

ship to the passenger carrier is as great a step in advance as was its first installation over previous methods. Its extension is bound to be rapid. More than 239,000 hp. was installed during the year, and we have more of such ships on order than our yards can handle during the coming year. Where turbo-electric drive is used, the rest of the ship is almost completely electrified, all of which requires motors and auxiliaries.

Radio need hardly be mentioned. The dream of being able to telephone one's friends and see them at the same same time has already come true, and the vision is so clear that movements of the lips can be understood without the sound. This has not yet been placed on a commercial basis but who can doubt that it will be soon? Several new methods of transmitting light waves without the scanning disk and its spiral perforations have been developed. One broadcasting company has been given a license to broadcast practical television; and where one leads, others quickly follow. As for music, there are the Theremin and the electric organ which substitutes radio tubes for the usual organ pipes.

The same revolution is entering the home. The average householder has just started to electrify his home. About 800,000 refrigerators were sold this past year, but a million will be sold next year, electric ranges will increase and also electric furnace tenders for both coal and oil. There are practical electric units for almost every home task, even for keeping accurate time.

Back of all these electrical devices must of course be cheap power. This must be true not only in places where there is a plentiful supply of coal but everywhere over the United States. Immense water power projects are being opened up. One point in connection with water power is government authorization of the Boulder Dam project, which will cost a total of $165,000,000 and will require 130,500,000 lb. of steel in various forms. Further work as Muscle Shoals will cost $34,000,000; the cost so far is $174,443,000.

The highest voltage now in commercial use to transport electric current is 220,000 volts a.c. Use of this type of current is based upon the fact that it can be transported at least cost. Direct current transmission in commercial use today runs as high as 400,000 volts, but this is in Germany. In this country we have very little d.c. transmission. The revolution in German practice is accomplished with the aid of the electronic tube. Six times as much direct current as a.c. can be carried over present lines. It only remains to make electronic tubes in large enough units to transmit larger quantities

Electric locomotives as far as the eye can see. The locomotive assembly floor, Erie Works, General Electric Company

Dr. Heinroth, Westinghouse Research Laboratories, tries his hand at the console of the Hitchcock electric organ, which utilizes harmonious "squeals" from radio tubes instead of from pipes

of current. The largest yet built transmits 200 kilowatts, or 268 hp. This development is of great significance. It means placing d.c. motors on a par with a.c. for many purposes.

Another economic method of generating electricity is by the binary method or the double fluid thermal cycle. The initial commercial installation of this method is at Hartford, Conn., where mercury vapor at 884 deg. F. is used for running a high-pressure turbine, and the exhausted vapor heats water to generate steam for a low-pressure turbine.

A more recent method uses a substance called diphenyl. Still another, a foreign one, uses an ammoniaciate thermal-cycle very much like that of those household refrigerators utilizing a gas jet. A saving of 30 per cent in fuel and 41 per cent in cooling water is claimed for the foreign method.

It is in electric drives that the greatest evolution will occur. It is becoming more apparent that noise is not only a deterrent to the efficiency of the worker, but is actually dangerous to health. This being so, it will be found necessary to find some way of driving machinery without reduction by gearing. This is being done at present in radials and some smaller drills, and modern feeds and speeds are hydraulically driven.

With one or more "can" type motors in the headstock and fewer gears, noise can be practically eliminated. The V-belt and the plastic gears are part of the answer but not the whole of it.

A still further possibility lies in the ability of the electronic tube to transform voltage and frequency and to vary them at will, without loss of torque. The element of cost enters in this latter case, however. The mercury arc rectifier is also largely displacing mechanical rectification. The D. L. & W. installation uses mercury for 69,000 hp. The electronic tube has the characteristic of transforming heat into power, regardless of the source of the heat.

A photo-electric tube, on the other hand, transforms light into power. It may be operated direct by a beam of light, or negatively by interrupting a light beam. This method is already in use for operating rolling mills, for opening doors, for safety devices on machinery, and for inspecting steel plate and fabrics. It can be adapted to shop inspection both as to quality and dimensions, for time study, even for telling how many men go to the washroom and whether they are smoking or not.

Just what will happen during the next cycle of industrial activity it is impossible to forecast, but it is safe to predict forward movement just as long as articles manufactured do not represent inflated costs. We cannot get something for nothing in industry any more than we can elsewhere.

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O. H. Caldwell, Editor of *Electronics* and one-time Federal Radio Commissioner, demonstrates to John A. Dewhurst the water-cooled grid of one of the new 200-kw. transmitting tubes for Westinghouse Station KDKA

EXECUTIVE FORUM

Leveling the Load

"HOW ARE things this year?" asked Bill Holland, settling himself in a chair opposite Donald M. Graham, President of the Viking Tool Company. Graham belonged to the more conservative school of executives; his opinions did not always reflect the most advanced thought, but they were considered and mature.

"The trouble with industry," said Graham, "is not so much the total volume of business as its violent seasonal fluctuations such as we've experienced in the past. These variations represent a heavy burden on manufacturers and hardship on their employees. Something should be done to correct this condition."

"It's up to you fellows at the head of industrial plants to cure the evil," said Bill. "Some concerns have done pretty well already in their own fields. There's Bausch and Lomb, and Procter and Gamble, for instance. As I understand it, each of these companies predetermine a year's output and spread production evenly to meet these figures. The accuracy with which they've done it is remarkable."

"That's all very well when you're making optical instruments or soap," said Graham, "but suppose your business is highly seasonal."

"The same plan is followed by some makers of seasonal merchandize," said Bill. "For example, the May Oil Burner Company, which is distinctly in this class, has done much to smooth out manufacturing fluctuations. So have the Hickey-Freeman Company and the Dennison Company."

"When you get into clothing and paper products." said Graham, "you're outside my field of experience. My interest is in the metal-working industry where there are certain factors which make a smooth curve next to impossible. Any scheme to cut down fluctuations that I have seen is based on building for stock during the slack months. Change in design makes it unwise to do this in our field. Old models must be sold under cost or scrapped."

"If you search too hard for trouble," said Bill, "you're beaten before you start. But to get closer to home, there's the Link Belt Company which stocks parts such as loaders, vibrating screens, and speed reducers. The Norton Company manufactures to stock against sales forecasts balanced against variations in incoming orders."

"Accurate forecasts are extremeley difficult in most divisions of the metal-working industry," said Graham. "People use soap in slack times, but there is a drastic decrease in machinery demand. The competitive situation is another phase to consider. We're all working to make the buyer impatient with products he has been accustomed to use. This does not encourage heavy stocks. Then there is the expense of storing and carrying finished stores. I understand that the E. G. Budd Manufacturing Company found the problem of storing automobile bodies precluded building for stock."

"Like all desires," said Bill, "your wish for a smooth production load won't come without some sacrifice. You must consider what it is worth to have an even flow of materials, a low labor turnover, and a contented organization. Many manufacturers have found interest and storage charges less costly than overtime on a fluctuating schedule."

"But there are changing material prices to consider," said Graham, "and the additional danger of overproduction. It's bad enough to be left with excess capacity without the added burden of a large inventory. Such a condition leads to dumping and price cutting."

"Many companies, that are now planning their operations successfully, thought at first that it couldn't be done," said Bill.

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What Do You Think About This Problem?

The feasibility of diminishing the violence of seasonal manufacturing operations has been widely discussed. Many companies report success in their efforts in this direction and are highly enthusiastic about the results obtained. Other attempts have met with discouraging limitations.

No one will deny the desirability of keeping the ship of industry on a more even keel. But to what extent can this be done? What is the best means of attempting it? Your opinion on these questions may interest other readers of *American Machinist*.

. . . Discussion

of Executive Problems

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How Much Incentive?

From exhaustive experiments, it has been found that the average worker when employed on a straight daily or hourly rate, is only about 60 per cent efficient. The volume produced is considerably lower than is obtained when some incentive form of wage payment is used. Any method of wage incentive must be based on two fundamental facts, first that the standard time allowed for completing the job is satisfactory to the employer. Secondly, that the employee, because of extra endeavor is making a profit for his employer. A very important point is the saving in overhead, which must be added to the saving in labor cost to find the total amount saved for the company by the employee.

Adding together the saving in labor cost and in overhead, then dividing them equally between the employer and the employee, would safeguard all concerned. The employer would be recompensed for the outlay incurred by installing and supervising the system, while the employee would be guarded against the tendency to cut down the time allowed for completing a job.

—R. A. MAXWELL, *St. Johns, Canada.*

Is Interest Important?

True costs are the basis of the price of a product. If the price, based on these costs, is too high (assuming a reasonable profit) because of the lack of demand or too stiff competition, it is up to the management to reduce the costs wherever possible so the price may be in line with market conditions.

It is just as important to include interest on the capital or investment, as it is to include depreciation. While neither have been paid out, they are both justifiable. Any money borrowed by means of a bond issue or preferred stock—or even put back into the business from profits—should earn a return in the form of interest, apart from any profit that is contemplated. For profit should be a reward for proper management, and not mere interest on the investment.

—M. E. ROTCHY, *Planning Engineer, Celite Company.*

Square Deal or New Deal?

On taking over the control of an established factory, a new manager should try to forget his own ideas of organization for the first week or two. During that period, let him soak himself in his new firm's ideas. When he has taken time to do this, he can bring his own methods to bear. He can endeavor to see where one can be welded into the other, without disrupting the whole. This is infinitely better than taking control of a new job, with the adamant idea that one's own system is better than any other.

In the instance cited, if Jennings has the idea that Nolan will soon have him discredited, he must have precious little faith in his own capabilities as manager. It really looks as if he is not complete without his old general foreman. Then he is not a fit and proper person to manage any plant, and the sooner Nolan gets him out of it the better for the company.

The writer has just had the satisfaction of introducing a new system into a factory. He did not, however, go at it like a bull at a gate, but developed his own ideas into the existing system as far as possible, with the very gratifying result that there has been no disruption in the factory at all. The new system has been installed gradually and the necessary staff has been built up from existing material. He has thus retained the loyalty and support of the old staff. Where alterations or changes in the old staff have been necessary, they have been done diplomatically to cause a minimum of friction. Had Jennings worked on similar lines he would have proved himself a greater manager than he is now doing.

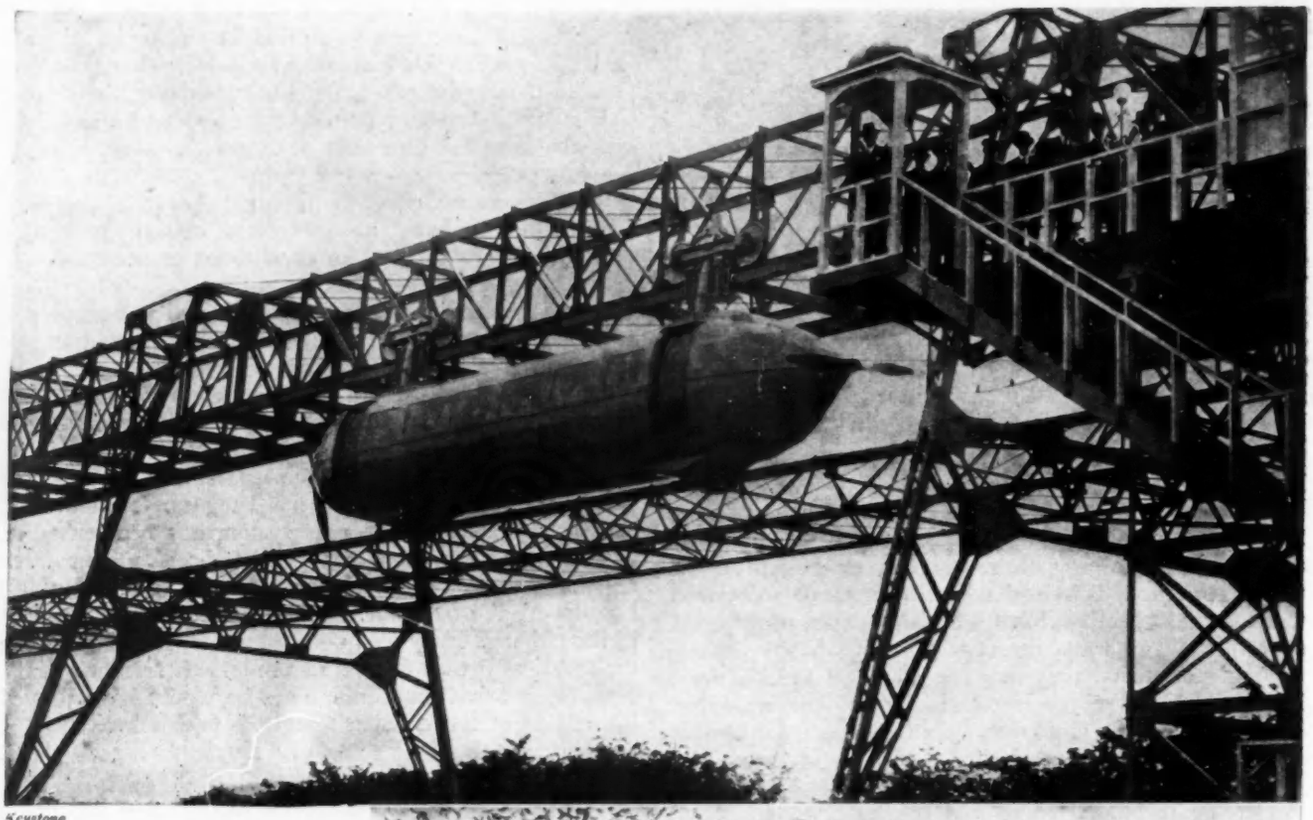
—F. TAYLOR, *Leeds, England.*

Dole or Control?

To folks abroad, more especially the working class, the national safeguarding of the worker when he is unemployed seems to be a godsend, but to us it is endless waste of money. Actually there are on the unemployment books some two million workers. They live all over the land, necessitating an army of clerks and hundreds of offices, some of them big enough to turn into manufacturing works. This all represents money, money spent with no earthly hope of the slightest return. The financial importance is insignificant however, compared to the moral situation. I can remember my feelings when, ten years ago, I had to line up in the queue to sign the books. Perhaps 30 per cent of the men I met there were getting relief for their families in way of cash, coal, meat, drink, and rent. After a few months of such life, they became accustomed to it, and took for granted that thus could they continue forever. Imagine such a man applying for a job. The would-be employer can offer the same wages for honest work, that the applicant has been receiving for months for the simple task of signing at the counter. A nation cannot continue to endure such measures. They are beneficial in a few extreme cases, but on the whole are an immense burden to the nation financially and morally. They cause a general increase in taxation, which causes an increase in manufacturing prices, and thus increases selling prices.

If money must be spent on relief, let it not be given carelessly with little respect as to how, when, or where it goes; let it be given in return for some work, even if that work is only sufficient to keep the man in touch with his tools. Roads could be laid, spaces reclaimed from the water, bridges built, lands developed, or a multitude of other constructive enterprises started that would keep men busy instead of loafing round on the dole.

—JAMES R. CORNELIUS, *Coventry, England.*



Keystone

Monorail systems of transport are being developed all over the world to meet necessities for higher speeds without danger. Some run above a single rail, balancing by means of gyroscope. Here is one hanging from one rail, guided by another below, and utilizing propellers to obtain the desired speed. It is an electrically operated unit in Glasgow, Scotland, and upon completion recently, ran at 150 m.p.h. Its full name is "The George Bennie Railplane System of Transport"

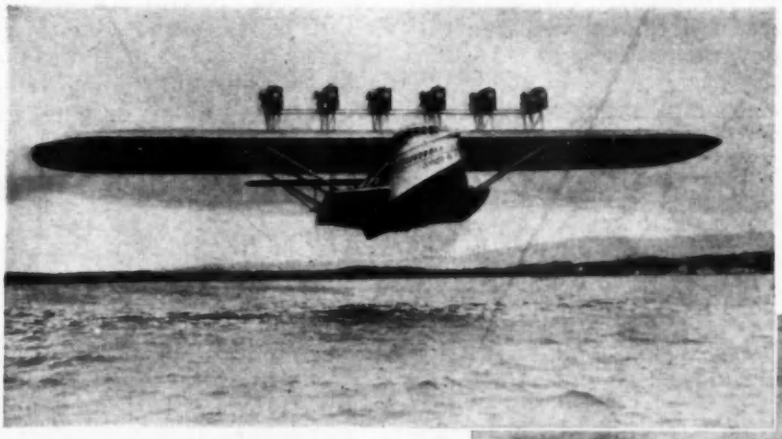
In some fields, lighter metals are supplanting heavier ones, and vice versa. Here is an "aluminized" coal truck, with an aluminum alloy body and hoisting mechanism, its total weight being 1,800 lb. less than its usual counterpart. Similar buses, tank trucks, dump trucks, and pleasure cars are being used increasingly, and offer an ever-growing field for the light alloys

AIR LAND AND SEA

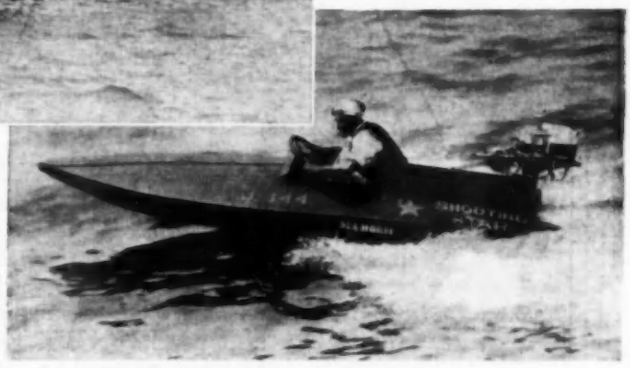
all three are being challenged by metal. The crusade is only begun

Keystone

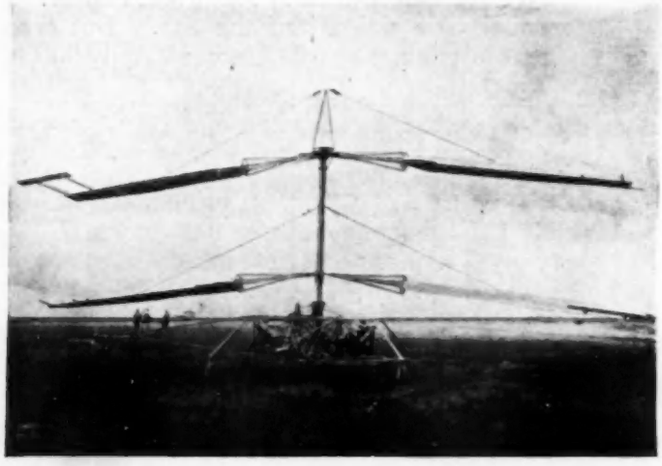
The "Zeppelin on Rails," Germany's latest transportation development. Its body is of aluminum and steel, and its 400-hp. motor drives it at 180 m.p.h. A lowered center of gravity permits it to pass over curves designed for 60 m.p.h. Incongruously, its propeller is of wood, metal tipped



The Dornier DO-X, the 169-passenger seaplane which will visit this country next year. Its structure is of aluminum and steel tubing



C. Mulford Scull and his Johnson-powered "Shooting Star," in which he has defeated a number of competitors. An increasing number of these boats are built with metal hulls to supplement the metal fittings universally used



D'Ascanio's revolutionary Italian helicopter. It has achieved a series of flight tests unprecedented in helicopter development. The fuselage is of nickel-steel tinned tubing, the motor a 90-hp. air-cooled Fiat. It differs from the Autogiro in that the rotors, turning in opposite directions, are motor driven

The Foreman's Round Table

THE TOWER OF BABBLE

"WHAT'S your trouble?" queried Al, as Ed's frowning face preceded its owner through the doorway. "You look as though you were facing the plague of locusts without a varlet to send for the Flit!"

"Cut the wisecracking, Al. I'm thinking," growled Ed. "You know Schwartz and Fougere, don't you?"

"Oh yes, the big German lathe hand and the French shaper man over at the pump works who are still deciding who won the war. Sure, I know them. Why?"

"Well, this morning it got worse than usual. Fougere called Schwartz a big Hun and laughed at his accent, so Schwartz up and pasted him one! They had to pull 'em apart, and now somebody's got to be fired. Neither one will quit—afraid somebody'll call him yellow—and no matter which one gets fired, Bill Adams, the foreman, will get called partial."

"But, Ed, how does that concern you?"

"Simply this much. Bill Adams started out under me, and when he gets stuck he comes to me for advice. I've gotta tell him what to do this noon."

"Well, why not tell him to fire them both?"

"Oh yeah, and lose two good mechanics instead of one? Not much! He'd rather have one of 'em transferred to Jim Judd's gang at the engine plant—you know they're both owned by the same bunch, Al."

"That would be a fine mess—and just when Jim Judd has everything running right since he put all the Italians in one bunch, the Slavs in another, and the Germans in a third, and then separated them as far as possible. He was telling me the other day that everything was rosy now."

"Yeah, everything running rosy—like fun! Some sweet day he's gonna have a gang war on his hands, then he'll see he can't segregate men by nationality without stirring up trouble."

"Says you! Jim's had less trouble than Bill so far—and Bill's using your ideas. What do you want Jim to do, run them man by man like Bill's doing, telling them they've got to get along or get fired—then finding himself in a position where he can't carry out his word? A hot system, that is, if you like hot ones!"

"But not so hot as Jim's, Al. He'll have a whole gang or two to fire—it's happened in other shops."

"Well, both of them might adopt Joe Cook's 'brotherhood of man' idea, telling them all they're brothers and should unite against the bosses, sharing all alike, getting the same wages, splitting all their possessions, dividing—"

"Shut up, I've heard all that before! 'We are all brothers in that great fraternity, the Mystic Knights of the Sea.' But even that organization of Amos n' Andy has a Kingfish."

"That sounds to me like Bill's present job, Ed."

"Well, what's Jim Judd, the lid of the Melting Pot?"

How should the problem of foreign-born employees, with their natural racial prejudices, be handled? Is segregation, or unity, the solution? Or is there yet another?

▸ ▸ ▸ Discussion of Former Topics

Sauce for the Goose

To secure efficient operation it is essential that responsibility and authority should go hand in hand. If an executive is to be held responsible for certain functions, he should have the necessary power to do what he deems necessary to accomplish certain purposes.

It is important in all cases, and especially so in functional organizations, to have a clear and concise organization chart and to clearly indicate the responsibilities and authority of the different executives. Moreover, it is more important for smooth operation that authority should be clearly defined, than to be concerned over who should be responsible.

Functionalization can be carried too far. Each factory is a problem by itself, depending upon its size and the nature of its product.

To take a line organization and change it directly and radically to a functional organization is likely to be ruinous.

Gradually changing over an efficient line and staff organization, making the staff officers functional heads will in many cases secure more efficient results due to their increased authority.

When functional organization is carried too far into the average small shop, it becomes a confusing thing to the workmen. When the old staff officers are given complete charge of their functions, as in the organization cited, much good may be expected from the change, due to the increased facilities they have for accomplishing results through increased authority and clear delineation of responsibility. —W. A. WALTER, *Purchasing Agent, Pneumatic Scale Corporation, Ltd.*

The Worm Turns

Why should not welfare work within the factory be undertaken by the firm and such work outside receive national direction? This is done in Italy, the Ministry of National Economy having established an organization —The "Opera Nazionale del Dopolavoro"—for "The promotion of the healthy and profitable enjoyment of the working people's leisure time by means of institutions for . . . developing their physical, intellectual and moral capacity." In Great Britain the Miners' Welfare Fund levies on colliery owners one penny (two cents) per ton of coal raised. This money is spent on recreation, convalescent homes, pithead baths, ambulance, education, safety research, etc.

When private welfare schemes extend beyond their legitimate bounds they can be harmful and wasteful. I have had personal experience with three English firms' pension schemes. On leaving the first concern, I had my own contributions returned, plus 2½ per cent interest. The company retained the whole of their own contributions. Since I had been with this firm for many years, this involved me in considerable loss. I refused to enter the second firm's scheme since, in the event of leaving, I should have been presented with a partly-paid-up deferred annuity insurance policy, the premiums on which I might have been unable to meet. The third scheme was generous. When I left, the whole of my own and the company's contributions, plus interest, was given me. The only drawback, perhaps merely unfounded humor, was that men were induced to accept lower wages because of "our fine pension scheme." One good, continuing pension scheme would have been better than any of these.

—A. W. KNIGHT, *Suffolk, England.*

Check and Double Check

A well managed small shop usually tries to have a supply of tools to suit its requirements. It then becomes a problem of knowing the requirements, which are not of a constant nature. It is the duty of the tool crib supervisor to note how often calls are received while the more expensive tools are out. Before asking for additional equipment, he should be sure that tools are being returned with reasonable promptness. After satisfying himself that more tools are needed, he can with confidence order these tools and feel certain that they will be a wise investment.

The two outstanding reasons for requiring checks on such cheap tools as small drills and not on lathe or planer tools are the probability of theft and the difficulty of classifying all the shapes of cutting tools. Many small tools lend themselves to use at home, and petty thievery would be very common if no checks were required. Some mechanics want their tools a certain way and object to turning in tools that are performing well. By requiring a requisition from each foreman for new tools and keeping a record of consumption, no waste should exist—which is the reason for requiring checks in any case.

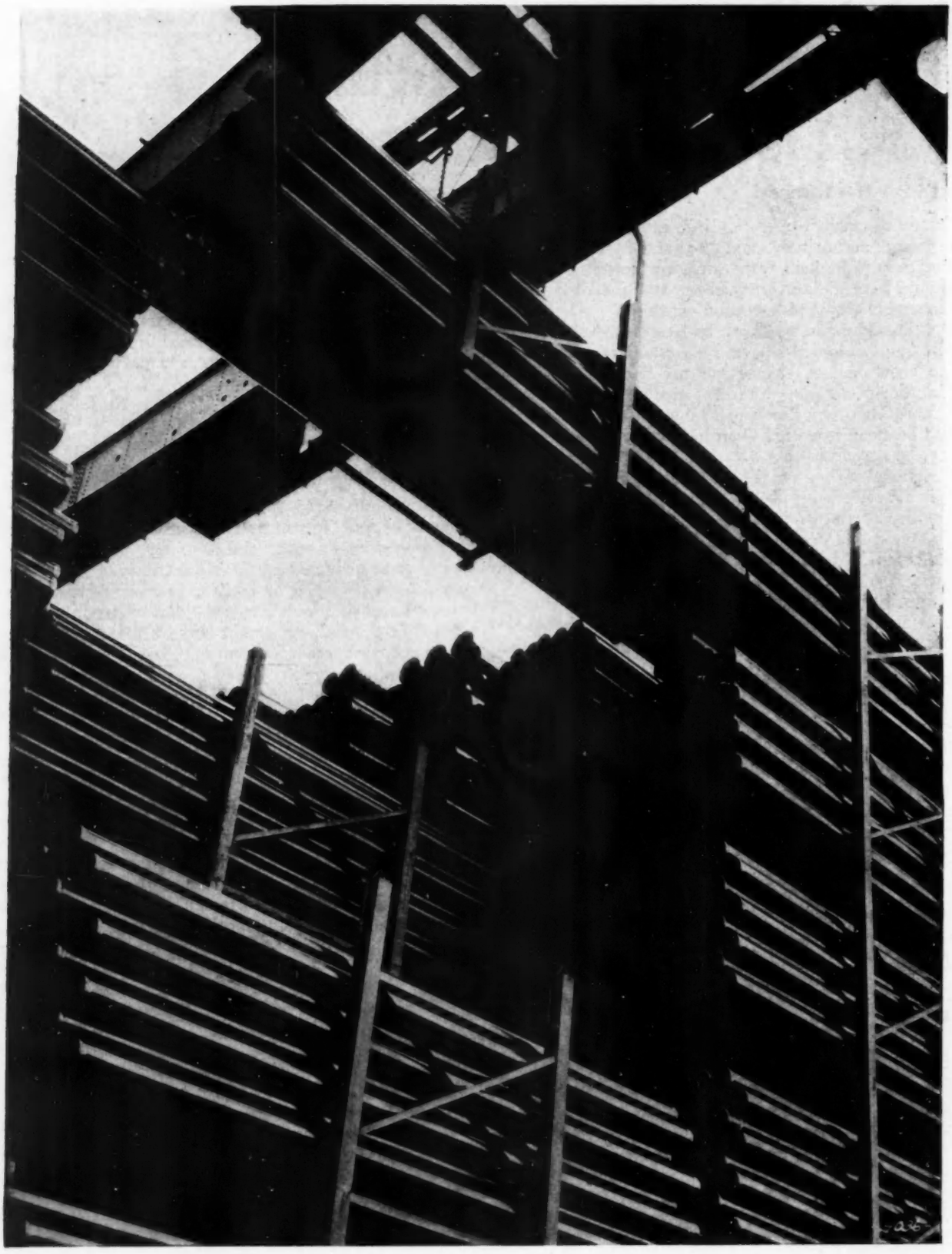
—L. F. SWENSON.

A Friend at Court

Apparently, Ed would hire his friend as a friend and also as a highly rated workman to be his assistant.

I believe the personal character of the man involved should be given a careful investigation. Industrial organizations are generally in need of efficient workmen, and are usually benefited by hiring them. It would be logical to hire the man as an assistant, providing his character is good and he has the reputation of being trustworthy.

In many instances it becomes necessary for the foreman to display his authority by handing his assistant a "calling down" for something or other; if friendship steps in, the lecture will be forgotten, and a reaction will follow. Maintaining respect among subordinates is the key to successful foremanship, and friendship must not be allowed to interfere. —P. L. BUDWITZ.



PIPE MAY BE REGARDED AS THE SIGN AND SYMBOL
OF THE CHEMICAL AND PROCESS INDUSTRIES

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DETROIT MICH.

LIKEWISE THE PROCESSES

Chemistry, textiles, food industries,

power, refining, and pipelines,

—all must come to the

METAL-WORKING INDUSTRY

OUR FOREFATHERS had little use for metals beyond those in their kettles and in the "fire-sticks" which made unwilling friends of the original first families of America. But as the years rolled by and Pilgrim became pioneer, then prohibitionist, advancing specialization in industry and in our daily lives made the growth of a great chemical industry a foregone conclusion. Men must eat, must wear clothes, must beautify their wives. Since man is a gregarious animal, his needs must be taken care of by an industry that has already invested a hundred millions of dollars in high-pressure, high-temperature plants which annually produce goods worth half this sum. Similar application of capital is being extended rapidly into new fields, and where there are new fields, there must come the metal-working industry.

To some extent, these developments in the chemical industry parallel similar ones in the power industry; much of the same class of equipment is used in both fields. And as these developments continue, there is opened a continually increasing field for metal-working. Though it is to be expected that a large proportion of the business will go to the older established companies in the field, its continuing enlargement offers opportunities for other industrial concerns willing to spend the necessary effort and make the necessary preparations.

Forgings are replacing castings, welded structures are entering, but there is still plenty of room for foundries, forgers, and fabricators alike. Valves, fittings, pipe, and containers are now being made more and more of alloys to give sufficient resistance to corrosion and erosion. Pumps and pressure vessels capable of resisting high pressures and corrosive actions at high temperatures are essential. Nor is the demand limited to so-called "heavy" equipment. Instruments and meters, both indicating and recording, are needed; as are indicators, glands, gaskets, expansion joints, and a host of other small parts, in every case of materials and of a design to withstand the new conditions under which present equipment would soon fail. And the manufacture of all of these specialized units will require increasing numbers of tools.

Plants for petroleum refining, cracking, and hydrogenation, are now numbered among those using or swinging to high temperatures and pressures. From the point of view of mechanical equipment, they represent a large market in which modernization is becoming essential to survival, so keen is competition.

Prominent among developments within the technology of the chemical industry was the putting into commercial operation of the results obtained from previous research work. Synthetic ethyl alcohol, practically in the laboratory stage in 1929, was turned out in a fairly large way in 1930 and promises to become increasingly important. Progress was reported in the production of synthetic butyl alcohol. Synthetic acetic production was enlarged. Many domestic coal-tar dyes made their first appearance on the market. A new denaturant for alcohol was developed and promises to replace materials formerly used for that purpose. These synthetic materials will undoubtedly require increasing amounts of equipment for their production.

In addition to the particular types of equipment already mentioned, rapid developments in chemical technology have extended the markets for equipment which have been more or less "standard" for years. The only requirements in alteration of some of these lines has been the substitution of the newer alloys, more particularly the corrosion-resistant ferrous alloys high in chromium and nickel, and the non-ferrous alloys similarly resistant.

Pipe, lined and unlined, ferrous and non-ferrous, fabricated into innumerable forms; fittings; gears of dozens of types and made of forgings, castings, or machined from blanks, form another imposing list of items of which the chemical industry is a large consumer. And relatively few industries require such complete conveying and material handling equipment. In many plants, everything is handled mechanically—particularly in the food industry—and this requires automatic control and such devices as loading, stacking, sealing, inspecting, measuring, metering, weighing, and testing equipment in addition to the machinery required for actual production.

Pipe lines themselves have an interesting future. Used in the past for transporting gas, both natural and artificial, water, petroleum, and similar fluids, their use is now being extended into a veritable network, and there are those forward-lookers who predict pipelines for the

transmission of powdered and granulated products over long distances in the not-too-far-distant future. Today it costs only four cents to pump 1,000 cu.ft. of natural gas 100 miles, so that Texas natural gas, costing about six cents a thousand feet at the wells, can be delivered in Chicago for forty cents. Artificial gas is also being piped over long distances. Is it then too bold to expect similar transportation for other products, such as grain, milled products, and even finished foods? Of course, it may be expected that tank lines and railroads will continue their expansion to combat this trend—which simply opens another field for the use of metals.

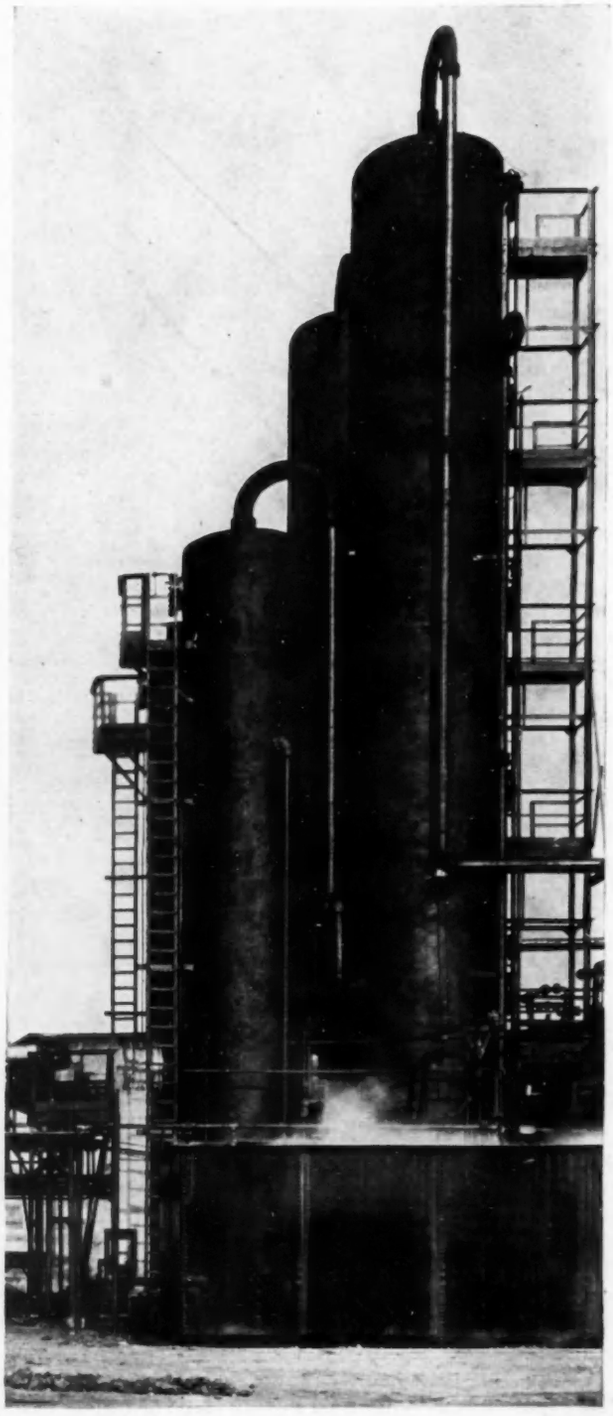
Welding is entering more and more into the construction of pipe and tanks, opening new fields for the companies engaged in welded fabrication. Pipe lines are joined in the field; there are few special fittings needed. Welding equipment is required, however, as are gas burners and similar consuming equipment at the delivery end.

Mechanization is going forward at a rapid rate in the food industries. In some respects, the equipment needed is similar to that required in the other chemical industry divisions, but very little is needed for high-pressure, high-temperature work. In fact, an increasing amount of equipment is being used of the types creating temperatures and pressures considerably below atmospheric.

Rapid freezing methods and the development of special containers for shipping and temporary storage at low temperatures already has worked a revolution in the marketing of fish and promises to have a far-reaching effect in other branches of the food industry. This, in combination with the availability of new refrigerants and less expensive refrigerating machines, and the greatly decreased cost of ammonia, has widened the market for many kinds of refrigeration and cold storage apparatus. Small refrigerating machines for retail establishments, as well as for domestic, office, school, restaurant, and factory use, are multiplying rapidly, and opening markets formerly non-existent. Unit coolers, performing the reverse function but similar in construction to unit heaters, now widely used, are among the new developments in food plant equipment. Other industries utilizing similar equipment are the dairy, drug, and beverage industries.

Machines used in the food industries include those for vacuum and pressure sealing, canning, pneumatic weighing and bottling, automatic packaging, wrapping, gluing, bagging stitching, casing, labeling, trade-marking, cooking by gas, steam, or electricity, baking and roasting by similar means, pasteurizing, drying, evaporating, de-hydrating, mixing, stirring, viscolizing, kneading, washing, humidifying, wet and dry grinding, sifting, sorting, peeling, skinning, cutting, slicing, chopping, filtering, freezing, cooling, and for scores of other processes.

Numerous electro-chemical processes, including cleaning and plating, require many million dollars worth of equipment annually, most of it furnished by metal-working shops. This is but one of the offshoots of the chemical industry—there are many others. Providing equipment just for some of them would undoubtedly set wheels turning which are now idle.



Typical, almost symbolic, of the dependence of the process industries upon the metal-worker, are the enormous petroleum - cracking installations

NEW BOOKS

OVERHEAD EXPENSE—*By A. Hamilton Church. 418 pages 5¾ x 9 in. Cloth board covers. Indexed. Published by the McGraw-Hill Book Co. Inc., 370 Seventh Ave., New York, N. Y. Price $5.00.*

One of the greatest stumbling blocks to more uniform cost keeping is the confused conception of overhead distribution. During recent years, accountants have made notable progress in standardizing direct costs, but because of its baffling problems, overhead still remains a source of confusion. The author, in this volume, presents much to clarify this elusive subject, and its relation to sales and profits.

He emphasizes at the outset the importance of a fundamental definition of overhead, describing it as "the total cost of maintaining all the processes of a plant in a state of preparedness for production over a given period" or "payment for manufacturing capacity." It is essential to standardize this process rate as distinguished from the wage rate and to avoid the common error of regarding one as a function of the other. Overhead or process rate regarded in this light is not a variable for a given operation and is not increased by maintaining idle plant capacity. Payment for unused capacity is waste and must be charged as such.

The volume deals in basic principles rather than bookkeeping details but contains specific examples to illustrate the author's contentions. The effect of such variables as production curtailment and increase, overtime, seasonal operation, intermittent expenditures and types of departmentalization is fully discussed. The synthesis of the process rate is given, including the space factor, the power factor, the storage-transport factor, the supervision factor, the organization factor, and special service factors. The media of control for various expenditures are fully described.

In conclusion the author outlines the effect of overhead on price-fixing and estimating as well as some special problems occasionally met. The volume is timely and well conceived. It is of interest to accountants and executives in search of factual data on their cost problems.

ENGINEERING KINEMATICS, SECOND EDITION—*By William G. Smith, professor of engineering drawing, Northwestern University. 343 pages, 5¾x9 in. Indexed. 420 illustrations. Clothboard covers. Published by the McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York, N. Y. Price $3.50.*

It is not often that textbook authors utilize the vast mass of industrial information appearing in trade magazines and catalogs, even though they may realize that such information is the latest available, written by men who are specialists in the subjects or fields they discuss. This author, however, has utilized every bit of this information applicable to his text, with the result that he has a book extremely up to date—which is more than can be said for most books of this character. Revolutionary changes in machine design, notably in gear design, during the past seven years, have made this second edition imperative.

Planned primarily as a university textbook in kinematics or machine design, the volume contains a number of problems at the end of each chapter, following one illustrative example completely solved. Innovations are problem forms having blank spaces, allowing the instructor to supply data, thus permitting the assignment of a different problem to each student or new problems each year. The text is a concise, extremely practical one, unusually well illustrated and carefully edited. It is so closely related to current engineering practice that it should prove a welcome addition to the engineering executive's, or practical man's bookshelf.

COMMERCE YEARBOOK. VOL. I—UNITED STATES—*678 pages, 6x9 in. Indexed. Published by the Bureau of Foreign and Domestic Commerce, U. S. Department of Commerce, and for sale by the Superintendent of Documents, Washington, D. C. Price, $1.00.*

Little introduction is needed for this excellent volume, which now appears in its eighth annual issue. It has behind it the entire statistical resources of the U. S. Department of Commerce with the added assistance of the Bureau of the Census and other bureaus and departments of the government. It is packed with data, comparative tables, and charts, providing ready reference material on all of the principal industries of the country, and the whole is arranged in accessible form. A few of the subject headings are: Employment, Immigration, and Wages; Wholesale, Retail, and Farm Prices; Foreign Trade; Fuel and Power; Construction Materials; Iron and Steel; Non-Ferrous Metals; Banking and Finance. The Commerce Yearbook is a volume that should be available in every executive office.

IMPURITIES IN METALS—*By C. J. Smithells. 190 pages, 6¼x9¼ in. Cloth board covers. Indexed. Published by John Wiley & Sons, Inc., New York, N. Y. Price $5.00.*

For the metallurgist who is going deeply into the study of the structure of alloys, this book will be highly valuable as it contains a wealth of data assembled from the investigations of many authorities. But for the factory executive it is not likely to find wide application. It should stimulate the foundryman, however, to a better control of impurities in alloys because of the great influence of these on the metals.

The material is well arranged, and in spite of the technical nature of the subject, is easily readable. The illustrations are well done to bring out the points of alloy structure discussed, and many charts are given to show physical effects of elements under varying conditions. An impression that is gained from reading the book is the great influence which even very small quantities of impurities have on some alloys, and it may do much to draw more attention to this point, resulting in closer foundry control to give maximum physical properties in any given material.

AMERICAN MACHINIST 1930 INVENTORY

of Metal-Working Equipment

THIS division includes manufacturers which supply motor vehicle plants with the following parts: bodies, tops, gears, rims, frames, wheels, radiators, windshields, axles, bumpers, shock absorbers, sheet metal for automobiles, and various other assemblies. It does not include makers of certain other parts of which the most important are engines, tires, springs, ignition apparatus, batteries, starting and lighting systems.

The 23 per cent of machines over ten years of age is six points under that for the same group reported in the 1925 inventory (Vol. 66 page 9). It is 21 points under the general average for all industries obtained for the prior count. The percentage of old machines in motor vehicle bodies and parts plants is the smallest thus far reported in the current compilation with the exception of the 3.6 per cent shown for aircraft manufacturers in Vol. 73, page 702.

This division therefore showed a physical condition appreciably better than the average in 1925 and improved upon this lead during the five year interval. The relative importance of the machine groups is more uniformly distributed than for most industrial divisions, turning, drilling, power presses, welding, grinding, and milling all constituting sizable percentages of the total equipment in place.

Report No. 20. Plants making motor vehicle bodies and parts

PER CENT OF MACHINES INSTALLED
Prior to 1920
1920-1929
PER CENT OF TOTAL IN EACH MACHINE GROUP
Turning 24 76 17.4
Drilling 22 78 17.7
Presses, Power 21 79 13.8
Welding 20 80 12.6
Grinding 33 67 11.5
Milling 22 78 6.7
Riveting 20 80 2.7
Threading 10 90 2.7
Gear cutting 44 56 2.5
Shaping 11 89 2.2
Presses, Hand 7 93 2.2
Hammers 30 70 2.0
Cutting-Off 26 74 1.4
Shears 16 84 1.0
Broaching 19 81 0.8
Polishing, Lapping, and Honing 23 77 0.8
Centering 50 50 0.6
Boring 16 84 0.5
Forging 31 69 0.5
Bending and Straightening 32 68 0.4
Planing 32 68 0.3
Wire Forming 26 74 0.3
Keyseating 22 78 0.1
AVERAGE 23 77

Machines in Plants Making Motor Vehicle Bodies and Parts

	Total Number in Plants 1930	Number Installed Before 1920
LATHES		
Engine	5,576	1,371
Hand Turret	1,480	462
Power Turret	1,198	352
Automatic and Semi-Automatic	2,373	180
Chucking (Not Chucking Machines)	78	
Speed and Bench	650	188
Toolroom Type	1,183	603
Other	446	125
CHUCKING MACHINES (Not Chucking Lathes)	1,441	180
SCREW MACHINES		
Hand	1,559	540
Automatic, Single Spindle	1,590	282
Automatic, Multiple Spindle	916	94
CENTERING MACHINES	603	329
MILLING MACHINES		
Hand (No Power Feed)	2,514	697
Bench	251	39
Plain (Knee and Column Type)	1,739	431
Universal (Knee and Column Type)	822	183
Vertical (Knee and Column Type)	446	39
Lincoln Type Manufacturing	266	86
Continuous, Rotary Table or Drum Type	650	63
Planer Type	86	
Other	321	
GEAR CUTTING MACHINES		
Rotary or Milling Type	486	102
Hobbing	1,433	721
Planing or Shaping	681	345
Other	47	
BORING MACHINES		
Horizontal Boring, Drilling and Milling	290	47
Vertical Boring Mills	258	47
Other	16	
JIG BORERS	23	
DRILLING MACHINES		
Radial	548	251
Upright, One Spindle	9,618	1,942
Upright, Two or More Spindles	2,851	744
Upright Gang (Two or More Heads)	509	31
Sensitive, One Spindle	2,404	728
Sensitive, Two or More Spindles	1,143	94
Sensitive Gang (Two or More Heads)	70	
Two, Three and Four Way	149	
Other	689	133
THREADING MACHINES		
Single Spindle Tapping	713	133
Multiple Spindle Tapping	368	16
Pipe Threading and Cutting	125	
Bolt Threading and Cutting	157	86
Thread Chasing	55	8
Thread Hobbing and Milling	478	8
Thread Rolling	47	
Other	901	23
PLANERS		
Open Side	70	23
Double-Housing	298	94
SHAPERS		
Vertical	188	55
Horizontal	862	204
Slotters	1,300	8
KEYSEATING MACHINES	70	16
BROACHING MACHINES	909	172
GRINDING MACHINES		
Plain Cylindrical	3,203	1,786
Universal Cylindrical	431	63
Surface, Reciprocating	595	117
Surface, Rotating	1,214	133
Internal	1,159	376
Crankshaft	611	16
Cutter	775	305
Floor, No Feed Attachments	979	258
Bench, No Feed Attachments	877	298
Abrasive Disk	619	219
Abrasive Belt	196	16
Centerless	830	39
Other	705	345
POLISHING AND BUFFING MACHINES (Including those in Plating and other Depts.)		
Abrasive Wheel, Hand Operated	619	164
Abrasive Belt, Hand Operated	31	23
Automatic and Semi-Automatic	63	
LAPPING MACHINES	164	16
HONING MACHINES	23	
CUTTING-OFF MACHINES		
Parting Tool Type	55	16
Power Hack Saw	728	164
Rotary Cold Saw	149	23
Bandsaw	282	55
Other	290	149
WIRE FORMING MACHINERY		
Spring Coiling	204	63
Other	70	8
WELDING AND CUTTING MACHINES		
Resistance Welding, Butt	439	117
Resistance Welding, Spot	5,960	1,425
Resistance Welding, Seam	8	
Resistance Welding, Other	666	110
Arc Welding	110	102
Electric Cutting	6,085	924
Gas Welding	125	23
Gas Cutting		
RIVETING MACHINES, STATIONARY		
Pneumatic	2,177	517
Hydraulic		
Power	681	16
PRESSES		
Punching Machines	2,906	681
Combined Punches and Shears	415	8
Hand, Arbor	1,919	133
Hand, Light Punch Press Work	55	8
Foot, Light Punch Press Work	321	16
Power, Crank Type	9,477	1,997
Power, Toggle Type	70	8
Power, Double Acting	525	70
Power, Dieing Type	141	16
Power, Trimming Presses	446	188
Power, Forcing, Arbor, Wheel	321	31
Hydraulic, Bending, Forming, Drawing	86	
Hydraulic, Wheel Forcing, etc	23	8
Baling, Power and Hydraulic	70	16
Other	172	102
BENDING AND STRAIGHTENING MACHINES		
Bending Brakes	196	31
Bending Rolls, Horizontal	102	8
Bending Rolls, Vertical	8	
Straightening Rolls	86	16
Other	16	16
SHEARS		
Knife	384	47
Rotary, Slitting	580	110
NIBBLING MACHINES	78	8
HAMMERS		
Drop	211	8
Helve	321	180
Spring	23	8
Steam	298	94
Pneumatic (not portable)	78	55
Other	1,292	298
FORGING MACHINES		
Bulldozers	110	23
Hot Forging Machines	282	141
Cold Headers, Bolt, Nut, etc.		
Cold, Swaging	110	
Forging and Flanging Presses, Hydraulic		
Other Forging Machines	23	
Total	106,118	24,491

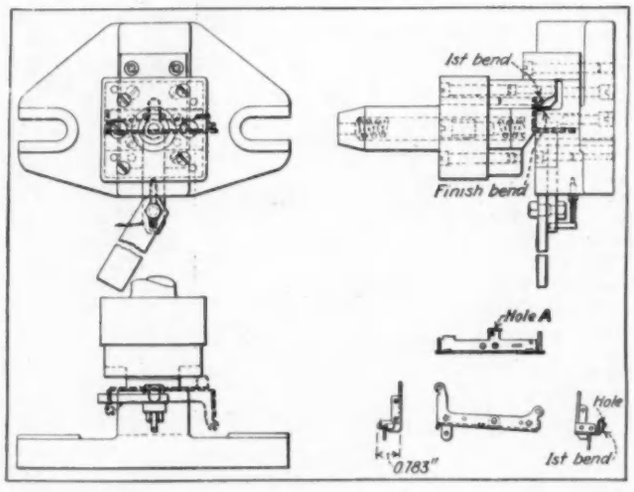
IDEAS FROM PRACTICAL MEN

Tools for Bending Ears in Two Operations

W. H. MALLIET
Supervisor of Design and Development, The Royal Typewriter Company

IN piercing ears bent up from sheet-steel parts, it is sometimes necessary to do the bending first and the piercing afterward. This procedure is especially necessary if the holes are to be pierced close to the body of the part. Otherwise, the holes are likely to be distorted by the drawing effect of the bending tools. It is customary to allow a space between the bending tools equal to the mean thickness of the stock. Since stock in which the tolerance is less than 0.004 in. cannot be bought except at a premium, it means that stock of the maximum thickness will be subject to considerable drawing action in bending.

If the bent ear in which the hole is to be pierced has another ear parallel and opposite to it within close proximity, the construction of a die having the proper thickness of wall to prevent springing under pressure of the



piercing punch, is a difficult problem. This may be solved by giving the ears two bends. About 45 deg. for the first bend will insure the correct positioning of the bend and will absorb the stretch, or pull, of the metal. After this first bend, the ears may be pierced. Following the piercing operation, the ears may be finish bent to 90 deg. without distorting the holes. The details of a part bent in the tools shown in the illustration can be seen in the lower right-hand corner of the drawing.

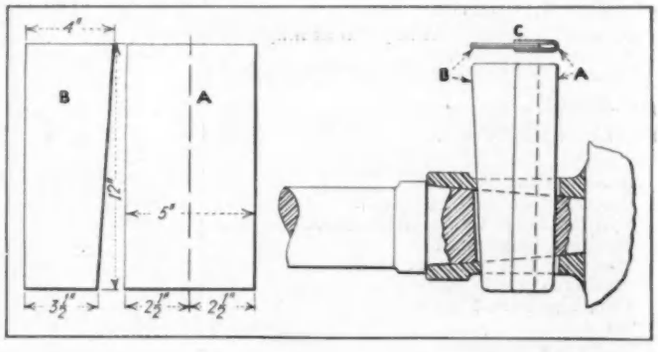
In the assembly of the tools in the press, they are set so that the punch will leave the ear at an angle of about 45 deg. for the first bend. With the ear at this angle, there will be ample room to pierce the hole. After the hole has been pierced, the part is again inserted in the die to complete the bend to 90 deg., the tools having been adjusted accordingly in the meantime.

It may be noticed that there is a spring pressure-block in the center of the punch to hold the part flat, and that a cam-actuated slide is provided to hold the part against the front side of the bending die. The cam-actuated slide is necessary to give the bending dimension of 0.783 in. from the edge of the part to the outside of the ear, as called for on the sketch of the part.

An Improvised Key Gage for Piston Rods and Valve Stems

H. H. HENSON
Cincinnati, New Orleans and Texas Pacific Railway Chattanooga Shops

In making and fitting a key for an odd piston rod, a gage that will give the size and shape of the key can be made in a few minutes. After the rod has been drawn in to its taper seat in the crosshead by the use of a draw



key, cut out two pieces of $\frac{1}{32}$-in. sheet steel to the dimensions shown at *A* and *B*. Fold *A* so that when *B* is inserted between the folds it will be gripped tightly.

The assembly can then be pushed through the key slots in the crosshead and the piston rod, as shown in the cross-section. The parts will slide one within the other, adapting themselves to the shape and size of the openings. Calipering the gage will give the taper and the end sizes of the key to be made. The thickness of the key can be determined by measuring the width of the key slot. Such a gage, but smaller in size, can be used for determining the sizes and tapers of keys for valve stems.

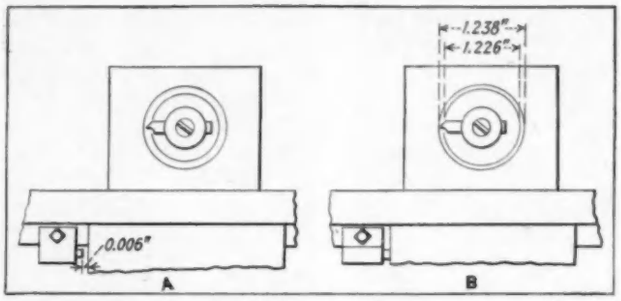
Boring in the Milling Machine

CHARLES KUGLER

In boring holes in the milling machine when an offset boring head is not available, and when a plain boring bar and a single-point cutter are used, the following is

a simple method of setting the cutter to the finished diameter of the hole:

Assume that the finished diameter of the hole is to be 1.238 in., and that the hole has been roughed out to a diameter of 1.226 in. To finish bore the hole to the correct diameter, the cutter must be set out 0.006 in., or one-half the difference of the diameters of the holes. Without moving the table, set the adjustable table-stop against the saddle. Then move the table 0.006 in. in



the direction away from the cut, as at *A*, using the micrometer collar on the table screw to get the distance accurately. With the cutter horizontal, set it out so that the cutting edge contacts with the wall of the hole.

Withdraw the work so that the cutter will be clear of the hole and bring the table back to its original position, with the stop against the saddle, bringing the hole central with the boring bar. The cutter will have been set out the required 0.006 in., and the hole can now be bored to the finished diameter.

■

Repairing Gears Having Broken Teeth

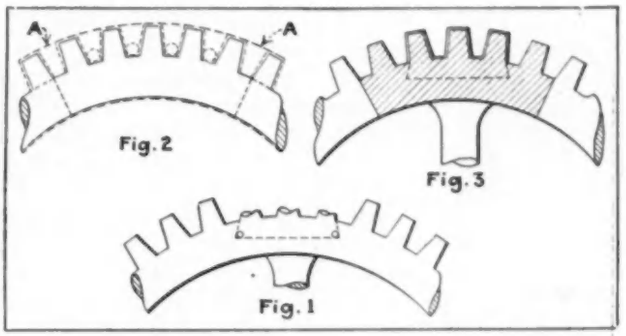
T. SMITH
Sutton in Ashfield, England

In an article on page 812, Vol. 72, of the *American Machinist*, H. Moore tells how he finds the centers of the new teeth when repairing gears having broken teeth. Perhaps our method of making repairs to broken gears will be of interest.

When the teeth of a gear are broken, we make an examination to see if it is going to be a big job to remove the gear from the machine, and also to find out whether or not there is room to use the electric- or ratchet-drill in cutting out the piece containing the broken teeth while the gear is in place. If there is not room to use either of the drills, then the gear must be gotten off. If we find that the gear can be repaired in place, we proceed as follows: A piece under the broken teeth is cut out of the rim, as in Fig. 1. Two holes are drilled, and the piece is cut out by a narrow hacksaw, first sawing downward into the holes. Then the saw is turned sidewise in the frame, and a horizontal cut made between the holes. The piece containing the broken teeth will now come away. With a dovetailing file and a square, the opening is made ready to receive the new piece.

If the gear can be removed from the machine, the opening for the new piece is cut on the shaper or slotter. In either case, after the piece containing the broken teeth has been cut out, a templet is made to cover one tooth space on each side of the opening. The templet blank is placed on the rim of the gear where the teeth are unbroken and the contour of these teeth is scribed upon it. The templet is removed from the gear, and is cut out to the inner and outer diameters of the rim, as shown by the circular dotted lines in Fig. 2. The tooth spaces at the ends of the templet are cut radially, forming tabs, as at *A*, so they can be bent down to hold the templet in place

Holes are drilled at the bottoms of the other spaces, and the contour of the spaces is sawed out. The templet is now put back on the gear and is filed to the contour of the teeth. After the new piece has been put in place, the templet is put on opposite to it, the tabs at the ends being bent down and peened in the spaces between the unbroken teeth. With the templet in the position shown in Fig. 3, the outlines are scribed upon the new piece. The templet is then removed and the tooth spaces are cut out as nearly to the lines as is possible. If the gear has been removed, the cutting is done by either a shaper



or a slotter. If the gear has not been removed, the cutting must be done by hand tools.

After cutting out the tooth spaces, the templet is put back and the new teeth are carefully filed to shape, using the templet as a guide. A square on the opposite side of the gear from the templet is used to check the squareness of the teeth. Instead of using a square, some of our men make two templets, one for each side of the gear. After filing the teeth as nearly correctly as is possible, the gear is given a run in with its mate. Any high spots that show are then filed down.

■

Cutting Multiple Screw Threads
Discussion

JAMES PEARMAN
R. Hoe & Co., Ltd., London, England

On page 172, Vol. 73, Mr. Harvey Chandler gives a method of spacing the various "starts" of a multi-thread screw by moving along the top or swivel slide of the compound rest and determining the spacing by either the micrometer index on the screw, by size blocks, or by both. He rightly remarks that this is a great advance on chalking the teeth of the change wheel on the spindle which is a very crude method at best. The method outlined by Mr. Chandler is satisfactory for screws of small pitch, with few starts but quite inadequate when the lead is rapid as for worms.

The two methods given here I have used in two plants with excellent results. Consider for example cutting a thread of $6\frac{3}{4}$-in. lead with four starts (or quadruple). Dividing the lead by number of starts gives an axial

pitch of $1\frac{1}{16}$ in. The first movement of the top slide by Mr. Chandler's method must be $1\frac{1}{16}$ in., the next movement is $1\frac{1}{16}$ in. more, making 3 in. from starting point. The final $1\frac{1}{16}$ in. brings the total movement to $5\frac{1}{16}$ in. for the fourth start. There are very few lathes where such a long movement can be obtained with a rigid slide, which is vitally necessary for work of this description.

The only lathe which I know of designed especially for this sort of work is that made by the firm of J. E Reinecker in Germany. This is a universal relieving lathe, and when supplied to English specifications, has a lead screw with two threads per inch. For rapid leads movement of a knob at the end of the headstock increases this ratio sixteen times. Thus with equal change gears as driver and driven, the lathe cuts an 8-in. lead. This obviates driving the lead-screw by means of belt, and gearing down and driving the live spindle of lathe from this, as often must be done with ordinary lathes. On the end of the lead screw is a square for a crank handle, ex-

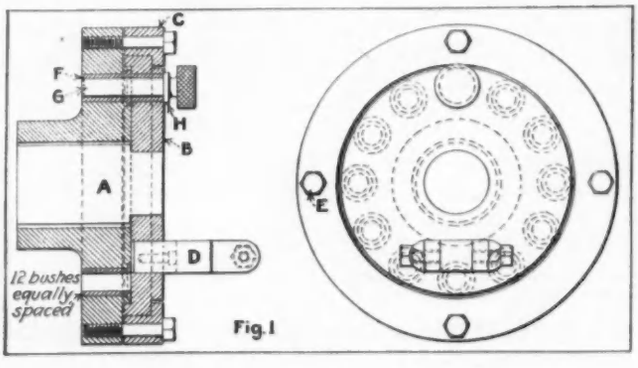


Fig. 1

pressly for getting the multiple starts. This may be used on any lathe, where the quadrant or sweep may be dropped and re-engaged. After the first thread has been roughed out the quadrant is dropped, the lead screw rotated $3\frac{3}{8}$ in. turns, and quadrant re-engaged. This can be done by placing a gear on the lead screw with teeth divisible by eight. The eight pitch of the lead screw gives a ratio of $\frac{27}{32}$ for the change gears. As 32 is too small a wheel for use as driven it may be compounded thus: *27* Driver on live spindle, 50 Driven; 100 Driver, 64 Driven on lead screw.

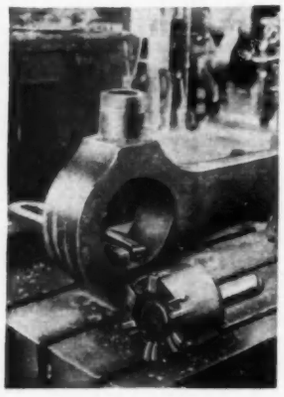
By bringing a marked tooth around to a pointer, disengaging, giving the lead screw three complete turns and $\frac{24}{64}$ of another, and re-engaging, you have your next start correctly. This can be done again with the others, guaranteeing a precision job.

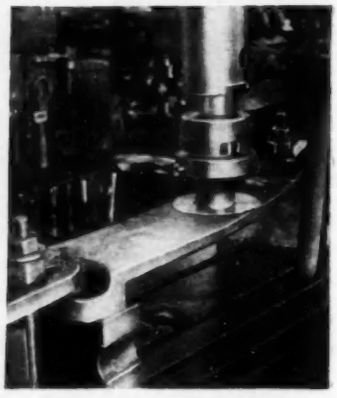
The second method is illustrated by Fig. 1. This is the simplest, and most foolproof method of all, provided that the quantity of screws is sufficient to warrant the expense of making the special driver plate shown. A catch plate *A* is made to fit on the live spindle and is provided with a register which is a snug fit in front plate *B*. These are clamped by means of ring *C* and bolts *E*. Catch plate *A* has twelve (or any number to suit) hardened bushings *F* which mate with bushing *H* in the front plate, which is indexed by plug *G*. The work is driven by means of forked driver *D* and an ordinary straight-tailed lathe dog. With twelve bushes in the plate *E* threads may be cut with one, two, three, four, six, or twelve starts covering all ordinary requirements.

Two Hollow End Mills

H. P. Leonard

Two homemade hollow end mills of inserted tooth form have been found very useful in the Silvis (Ill.) Shops of the Chicago, Rock Island & Pacific Railway Company. The first, Fig. 1, is used for finishing bronze





seats electrically welded in place at the base of the trunnion pins of Walschaert valve gear link checks. Three rollers held in the body of the tool guide it on the trunnion pins.

The second tool, Fig. 2, is a hollow mill for finishing the outside diameter of grease bushings on side rod ends. These bushings are made of Shelby tubing, electrically welded in place, and the cutters have a radius on the inside so as to form a neat fillet of the welding bead. For stabilization, a solid pin in the body of the tool engages the inside of the tubing and insures a wall of even thickness.

Both tools have taper shanks and are used in the spindle of a radial drill. Each has six inserted cutters held in place by taper pins driven in slots sawed $\frac{3}{8}$ in. from the nearest edge of the blade pocket.

■

Improvement in Boards for Drop Hammers

George Laidler
Chief Draftsman, International Harvester Company, Hamilton, Ontario, Canada

Some years ago we abandoned the use of one-piece boards for our drop hammers and adopted built-up boards composed of sections about an inch in width, glued together. Between each joint was a strip of leather running the full length of the board. These boards were purchased, and while quite satisfactory in use, they were rather expensive.

After some experimenting, we made a simplified type of built-up boards, two of which are used per hammer, as usual. Kiln-dried maple boards about 6 to 8 in. wide and from 1 to $1\frac{1}{4}$ in. thick, and of suitable length, were glued together in layers, making a laminated pile about 6 in. thick, no leather being used. While the glue was setting, the boards were held under pressure in a simple press consisting of a bottom plank and several steel yokes, each of which had a long screw.

The laminated timber thus formed was sawed lengthwise at right angles to the glued joints, making boards that were afterward trimmed to the required width and thickness for the particular hammers in which they were to be used. The average cost of labor and material for 8-ft. boards, 5x1¼ in., is less than one dollar each. We find boards of this type very satisfactory, being much cheaper than the purchased ones, and worn boards can be used up economically. When the boards become thinned by wear, they are dressed to an even thickness and several of them are glued together. They are then resawed, so that three old boards make two new ones.

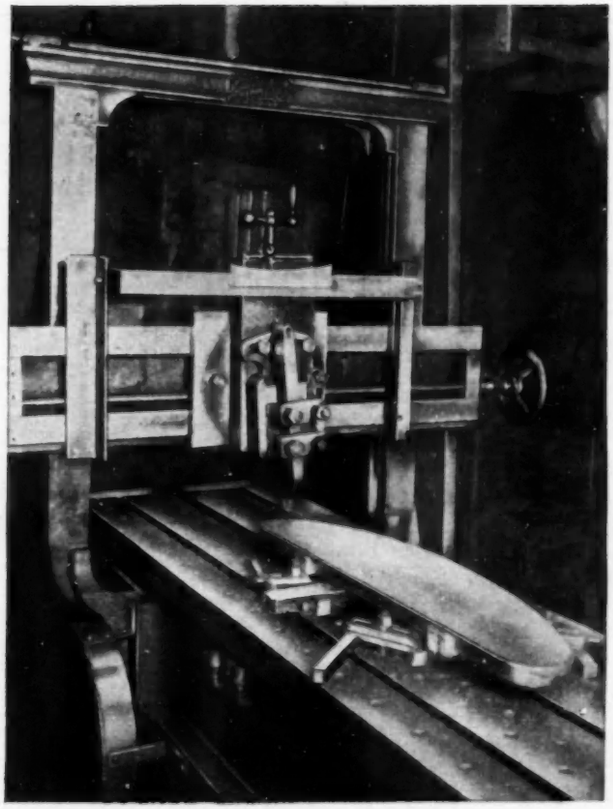
To prevent twist in the boards, we are careful to store them in a very dry place adjacent to the forge, and to lay them in flat piles.

■

Concavities and Convexities—*Discussion*

JACK CAGLIOSTRO
Efficient Machine Shop

Recently I had a repair job which called for replaning a casting with a concave surface and used the set-up shown in the illustration. Two pieces of angle iron are gibbed to the crossrail by pieces of cold-rolled steel. The leg of each angle is slotted for about half its length. Between the angle irons is supported a crossbar of flat stock, offset to clear the planer head, and upon which the templet is mounted. The crossbar may be adjusted vertically within the range of the angle iron slots. The upper edge of the templet corresponds to the curved surface to be cut. A dial indicator is held by a thumb screw in a slotted piece of steel screwed to the top of the vertical slide of the planer head.



In taking the cut, the crossbar and indicator are adjusted until the dial reads zero. This is done with the tool at the edge of the work at the correct depth for starting the cut. At the end of each stroke, the head is fed across and the vertical feedscrew turned by hand until the pointer again reads zero. This insures that the tool slide exactly follows the templet. The settings were readily made without stopping the machine.

The arrangement has been useful in planing other irregular shapes both concave and convex.

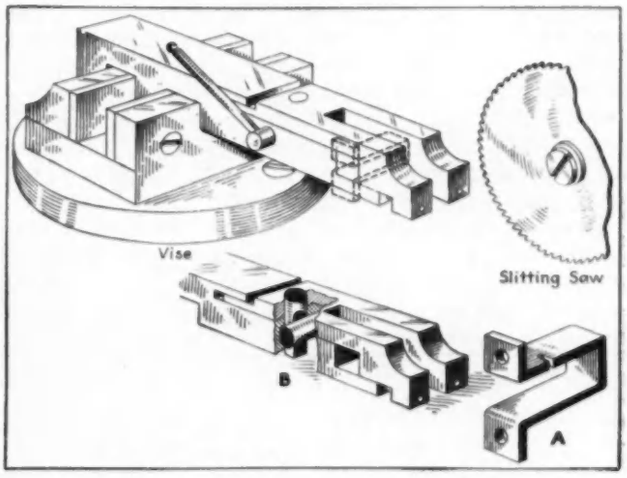
■

Notching Fixture for a Small Part

CHARLES H. WILLEY
Superintendent of Manufacturing, Hoyt Electrical Works

In executing a contract for a large quantity of U-shaped parts, such as the one shown at *A* in the illustration, one of the requirements was that one leg of each part be notched to accommodate a pin in its mating part. The notching operation was performed in a milling machine, using a slitting saw.

The fixture consists of a base and a cam-operated sliding member, the part being placed in the opening *B* between the steps in the base and the sliding member.



In the broken sectional view below are shown the operating cam and the pin against which it abuts. Guided at the rear by a tongue engaging a slot, and at the front by two pins, the sliding member is operated by the lever shown. Springs behind the guide pins force the sliding member forward when the cam is released, permitting the part to be removed and another one inserted.

■

Applying Rolls on Forming Dies

E. J. TANGERMAN

In forming eyes and hooks of ¾, ⅞, and 1 in. round iron bar at the plant of a railway equipment concern some difficulty was encountered when slightly worn forming shoes scored the stock. In addition to creating burrs, which must later be removed by grinding, the scoring was in some instances so serious as to make it necessary

to scrap pieces. The difficulty was finally removed by replacing the shoes with a roll, having in its rolling surface, a groove conforming to the diameter of the bar. This roll turned freely with the motion of the machine and eliminated the scoring entirely. This idea has been applied to pipe-bending machines and similar tools for many years, but apparently has not yet been applied to eye-bending and similar machines, since this equipment as received from the manufacturer carries a hardened metal shoe which causes this trouble.

The same idea was applied later to dies for forming steel bar where it was necessary during the forming operation for the bar to be drawn further into the die. Rolls of this type inserted in the die allow the bar to draw easily without scoring it and without wearing down the die, obviating the necessity for frequent remachining of die surfaces.

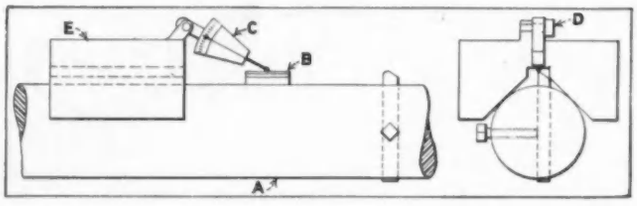
■

Setting Tools for Precision Boring

ERNEST FOLDVARY
Consulting Engineer

Setting a single-point boring tool to bore a hole to a limit of ±0.0002 in. in diameter is a rather difficult task, but it can be done by the method here described, providing the boring machine is in good condition and the boring bar is properly adjusted in its bearings. The necessary tools are a V-block with an indicator attached as shown in the illustration, and a gage block of the necessary thickness. Since the diameter of the hole bored will be equal to the diameter of the boring bar, plus twice the distance the cutter projects from the bar, the thickness of the gage block must be the same as the projection of the cutter from the bar.

In operation, place the gage block and the V-block carrying the indicator on the bar and bring the indicator



point in contact with the top of the gage block. Adjust the body of the indicator until the reading is zero. Remove the gage block and move the V-block until the indicator point is directly over the cutting point of the cutter. Then adjust the cutter until the reading of the indicator is zero. The cutter will now project from the bar a distance equal to the thickness of the gage block, and will bore a hole of the required diameter.

■

Correction

Referring to his discussion on "Cutting Perfect Threads" in Vol. 73, page 750, O. D. Bradshaw writes that the compound rest should be swung to 28 deg. one-half the angle of the cutting tool instead of 30 deg. as stated.

SEEN AND HEARD

●

Good Work and Responsibility

TWO of the charges against employee unions have been that they lack responsibility and that a union card is no guarantee of a good workman. But from Milwaukee comes the news that the electricians' union is to underwrite the skill of its members, who will themselves be responsible for faulty workmanship. An unusual trade agreement with contractors binds the local union to making every worker measure up to the requirements of his grade of work. Bad workmanship is to be charged directly to the man responsible. Members who fail in practical work will be demoted to lower grades and must go to school in the technical high.

When a union card really guarantees good work, organized labor will have taken a real step forward.

—*J. R. G.*

Changing Ideas in Finishing

"READING about this modern inventory-taking in *American Machinist* makes me smile," said a venerable friend who built lathes in the early Nineties. "We used to carry the darndest list of stuff you ever saw. I remember one item—a hogshead of emery that was up in the attic—I'll bet I carried that hogshead on the inventory for fifteen years. You know, 'So many pounds of emery at 7 cents a pound,' and for fifteen years I didn't know what it was for. But one of the old-timers told me one day. Back in the Eighties they used to finish lathe ways as well as they could, then put some emery on the ways and the carriage on top. Pushing the carriage back and forth over that emery fixed the ways up soon enough, and think of all the scraping it eliminated! But can you imagine a lathe builder doing that today? Oh boy!"

—*T.*

Soft Copper Gaskets

COPPER-ASBESTOS makes an excellent gasket for many purposes, but Franklin engineers have found that, for making a permanently tight joint between an aluminum cylinder head and a cast iron cylinder, where considerable difference in expansion occurs, a gasket cut from a fairly thick sheet of soft annealed copper does the trick more acceptably.

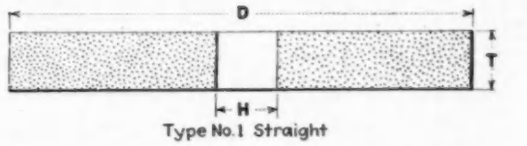
Inspection at the Work

ALTHOUGH it may appear obvious that one way to minimize scrap is to inspect work at the machine during the progress of production, and before any considerable number of improperly sized pieces can accumulate, inspection often is delayed until the faults it seeks to avoid have injured, perhaps beyond possible salvaging, a large number of pieces.

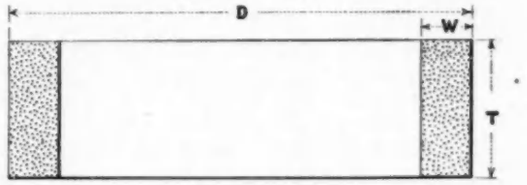
Daily or even more frequent checking of tool setups and dimensions has obvious advantages, yet is too often overlooked or neglected. Ostensible "savings" on inspection cost frequently result in the falsest sort of "economy."

—*N.*

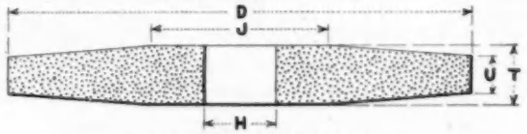
Standard Types of Grinding Wheels



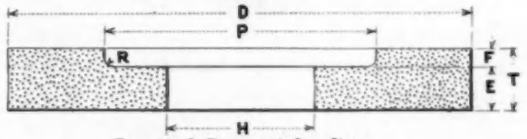
Type No.1 Straight



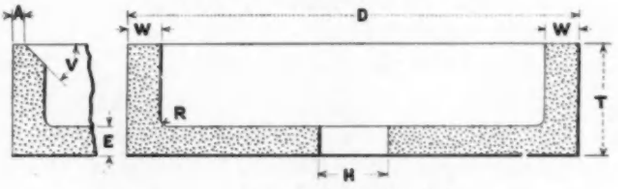
Type No. 2 Cylinder



Type No.4 Tapered Two Sides

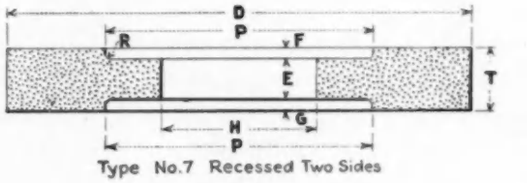


Type No.5 Recessed One Side

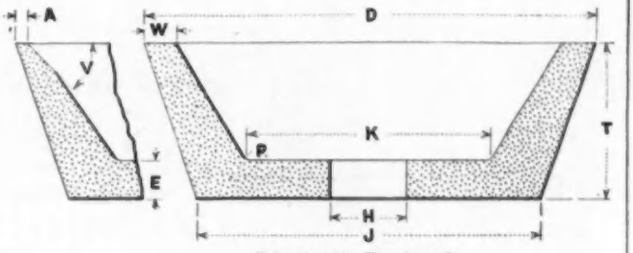


Type No.6 Straight Cup

(Wheels of this type can be furnished with beveled face)

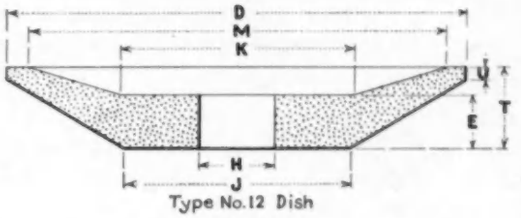


Type No.7 Recessed Two Sides

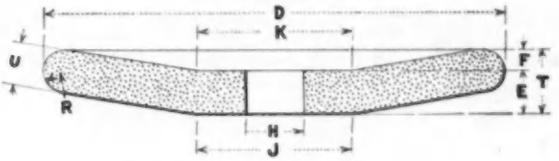


Type No.11 Flaring Cup

(Wheels of this type can be furnished with beveled face)



Type No.12 Dish



Type No.13 (Saw Gummer) Saucer

A- *Flat spot of beveled wall*
D- *Diameter (over-all)*
E- *Center or back thickness*
F- *Depth of recess (See type 5)*
G- *Depth of recess (See types 5 and 7)*
H- *Arbor hole*
J- *Diameter of flat or small diameter*
K- *Diameter of flat inside*
M- *Large diameter of bevel*
P- *Diameter of recess*
R- *Radius*
T- *Thickness (over-all)*
U- *Width of face*
V- *Angle of bevel*
W- *Thickness of wall*

A JOINT conference of representative manufacturers, distributors, and users of grinding wheels, held on Sept. 10, 1925, drafted a simplified practice recommendation which was later adopted by the industry. This recommendation, as revised by subsequent meetings of the standing committee and approved for promulgation by the Department of Commerce, limits the list of stock types of grinding wheels to those shown above, tabulates sizes and dimensions, and establishes standard nomenclature for various classes of work. The recommendation does not set these sizes and dimensions arbitrarily, but is a guide for future practice, those companies not having older types of grinders being able to purchase proper wheels for them until such time as all become obsolete.

Complete information may be obtained from Simplified Practice Recommendation No. R45-28, published by the Division of Simplified Practice, Department of Commerce, and available from the Superintendent of Documents, Washington, D. C., for 15 cents. The nine types of wheels shown are representative of practically all grinding wheels used on standard types of grinding machines. This classification will simplify the stocking of wheels and will also enable the user to order accurately by giving the type number and complete dimensions given in the recommendation.

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

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VOL. 74 No. 1

Beginning Volume 74

AMERICAN MACHINIST begins volume seventy-four with this number. Founded almost fifty-four years ago by Horace B. Miller, with Jackson Bailey as its first editor, it has gone forward continuously under the same name. It has been edited by Frank F. Hemenway, Fred J. Miller, Frederick A. Halsey, Leon P. Alford, John H. VanDeventer, and Ethan Viall, in that order.

Headed by Kenneth H. Condit and Fred H. Colvin, the present editorial staff consists of William W. Dodge, managing editor, S. Ashton Hand, Frank J. Oliver, Jr., George S. Brady, H. R. LeGrand, Chester B. Lord, E. J. Tangerman, Herbert Chase, C. G. Smith, and John Haydock, Jr.

Encouragement

THERE ARE two encouraging signs, not so much of immediate business, as of faith in the future and a kindly interest in the welfare of employees. With few exceptions the machine builder is busy with new designs either to improve the present product or to provide new machines to meet new demands almost as soon as they arise.

There is apparent also a more friendly feeling between management and men than on certain previous occasions. Work is being staggered in some places, short-timed in others. And, while the desirability of holding the organization together is not forgotten, there is at the same time a genuine concern as to the welfare of the men and their families. The problem of unemployment is being studied as never before, and plans are being advocated and tried that would have been considered Utopian a decade ago. The General Electric plan is an example.

No one who has gone through previous periods of a similar nature can fail to be impressed by the spirit with which both management and men are meeting the present one.

Five Days or New Products?

EVEN before our present troubles beset us many a voice had been raised for the five-day work week. And now, of course, these voices have become a chorus. But is the five-day week inevitable? Have we reached the point where the only way to balance consumption and production is by increasing leisure?

Charles F. Kettering, famous for his achievements and his interest in industrial research, thinks not. In an interview published in a recent number of Saturday Evening Post, Mr. Kettering proclaims his faith that the American people will not be satisfied to stop at the present stage in their development.

If no new industries develop to add to human happiness and industrial prosperity, then we must certainly curtail our machine-multiplied productivity. We must shorten our work day and also our work week. But, although the new industries have not as yet appeared, there is no reason to think that they never will. To think that is to assume that the work being done in our research laboratories in industry and in the universities will come to nothing. And that is a most unsafe assumption, because many of our research projects have no more than scratched the surface of the mines of information and potential utility that lie beneath.

An indication of the soundness of Mr. Kettering's position lies in the increasing rate at which new materials, new devices, new machines have been brought out in the last few months. Depression has not stopped such advances. On the contrary, it has accelerated them—sufficient proof, it would seem, for contending that we are going ahead despite discouragements. In one field alone, that of production equipment for metalworking plants, a new record was established during the last six months of 1930. In the Semi-annual Shop Equipment Review Number of American Machinist, to be published two weeks hence, some six hundred items will be listed, many more than in any previous similar number. And new things in other fields, as indicated elsewhere in this issue, are coming at a rate that bids fair to be accelerated steadily as the years come and go.

Shortened work periods may be enforced in dull times, perhaps, but as current practice in times of prosperity their continuance is at least a subject for debate.

SHOP EQUIPMENT NEWS

Barnes No. 204 Self-Oiling, All-Geared Hydraulic Honing Machine

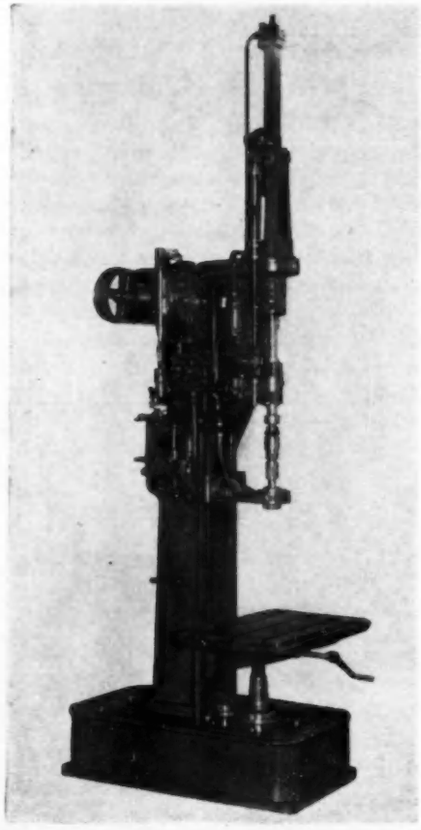
Bores up to 4 in. in diameter in work up to 20 in. in diameter can be honed on the No. 204 honing machine developed by the Barnes Drill Company, 814-830 Chestnut St., Rockford, Ill. The important characteristic of this machine is its reciprocating and rotating spindle, hydraulically controlled as to length of stroke. The table does not reciprocate. An Oilgear pump and a special valve control are used for obtaining the automatic spindle reciprocation. The cycle of reciprocation may be changed to suit the work while the unit is running by means of the volume regulator control. Length of stroke may be set by quickly adjustable stops for the right amount of over-travel of the hone at each end of the cylinder. A stroke control rod may be used at will for short strokes at any point in the travel, to remove taper or to make any desired correction of cylinder.

Examples of work which can be handled on this machine are: small engine cylinders, small compressor cylinders, small pump cylinders, hydraulic brake cylinders, cast-iron bushings, bearings, and piston-pin holes. Cylinders and bores that have been reamed to within 0.001 to 0.002 in. of size may be finish honed on this machine in less than one minute.

For honing, long stones of 3, 4 or 6 in. in length, according to size and length of cylinder, are used. These abrasive stones are held under positive spring pressure against the cylinder wall. Coolant is thoroughly cleaned by a filter in the base.

As in the drilling machines manufactured by this concern, the spindle has six splines. The hydraulic cylinder provides for any vertical spindle travel up to 12 in., and is superimposed directly over the spindle.

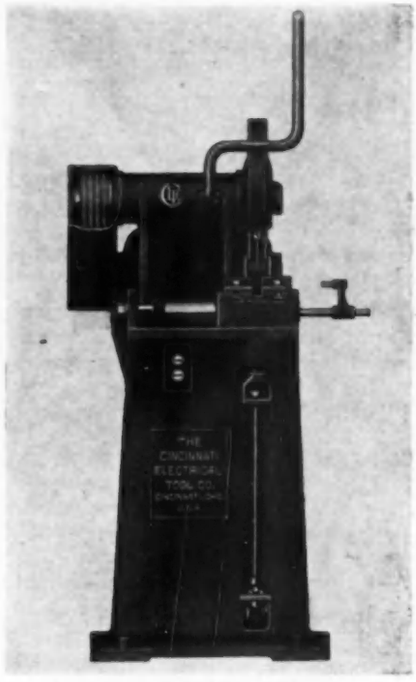
Specifications: Height of machine to extreme top, 11 ft. 1 in.; distance, center of spindle to face of column, 10¼ in.; maximum distance from top of table to nose of spindle, 41 in.; minimum distance, 4½ in.; rate of reciprocation, 1 in. to 50 ft. per min.; size of regular table, 17x28 in.; vertical travel of table, 22½ in.; floor space, 45½x20 in.; weight, with motor and starter, 1,700 lb.



Small engine, compressor, and pump cylinders and cast-iron bushings, bearings, and piston-pin holes of any size up to 4 in. in diameter can be honed on the Barnes No. 204 Hydraulic Honing Machine

Cincinnati High-Speed Cut-Off Machine

Alloy steels and non-ferrous metals in various sizes, angles, and shapes up to 2¼ in. can be cut off on the high-speed, abrasive, cut-off machine announced by the Cincinnati Electrical Tool Company, division of the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio. This machine uses an abrasive wheel either 12 or 14 in. in diameter by $\frac{3}{32}$ in. thick by 1 in. bore, and operates at a peripheral speed of approximately 15,000 to 16,000 s.f.m. The wheel is completely guarded with the exception of that portion necessary for the cutting operation. Sparks and abrasive dust are carried backward from the operator through an exhaust connection to a water pan within the pedestal.



Both straight and angle cuts in alloy-steels and non-ferrous shapes up to 2¼ in. can be made with the Cincinnati V-Belt-Driven, High-Speed, Cut-Off machine

A 7½-hp., fully enclosed, ball-bearing motor furnishes drive to the machine and operates at 3,600 r.p.m., with V-belts from the motor to the spindle carrying the cutting wheel. The cutting wheel, spindle, and wheel guard are mounted on a swivel arm, which pivots on the pedestal and is balanced by the weight of the motor in the rear. The machine is suitable for making straight cuts or angle cuts up to 45 deg. the same vise being suitable for the various cuts. The vise is mounted and clamped to the base of the machine, graduations on

the table making angle cutting accurate and fast.

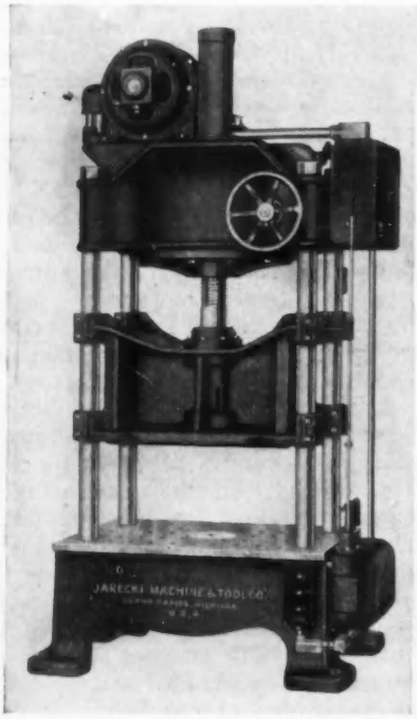
Material to be cut is held in the vise by pressure on the foot lever for both straight and angle cuts, and the abrasive wheel is moved into the work by means of a hand lever at the front of the machine. No water or other coolant is required when cutting various materials, there being no danger of drawing the temper. A stop is provided which can be set for any depth of cut within the capacity of the machine, and the length of the material to be cut is regulated by a longitudinal stop, which is adjustable to various lengths. The machine is 60 in. high and the floor space required is 43½ by 26 in. The weight is 1,250 lb.

Jarecki Power Screw Press

A 100-ton model has been added to the line of power screw presses manufactured by the Jarecki Machine & Tool Company, Grand Rapids, Mich. This machine is power operated by a 10-hp., high-torque motor, and is equipped with an automatic reversing type switch, enabling the operator to predetermine the depth of the ram travel before the automatic reverse engages. In addition, two limit switches are employed, regulating the extreme travel of the ram in both directions. A push-button type switch is also provided, enabling the operator to start, reverse or stop the ram instantaneously.

The handwheel located on the head permits inching motion to the ram. Thus, the machine is a one-man set-up type. In shearing-in a punch with this press, a straight movement is obtained free from any springing action or error in alignment, which insures a straight punch that can be ground all the way down. In raising the punch there is no wedging action on the part of the die. This feature is particularly valuable in the case of progressive dies. With the hardened die fastened securely in position, the punch can be removed to work on and can be replaced in exactly its former position as often as desired.

Ample clearance has been provided between the bed and ram. The die can be blocked up on parallels to allow clearance for springs, cams, and other devices, to allow inspection of the action of the punch in the die, and timing. This allows the punch to be lined up with the die and then raised high enough so that pressure pads, stripper plates, and springs can be conveniently mounted without taking the punch from the press. After they are mounted the punch can be brought down again into the die for checking. This space is also valuable in making forming dies.



Jarecki 100-Ton Power Screw Press provided with convenient control for setting up dies

Adams Multi-Speed Reducers

The variable speed reduction box, developed by The Adams Company, Dubuque, Iowa, differs from the conventional type of speed reducer in that it combines in one housing a speed reduction and a sliding gear box mechanism, making the unit adaptable to any piece of equipment which it is desired to drive from a constant speed motor, and yet on which a variation in output shaft speeds is necessary. This unit incorporates four speed changes, which are obtained through a single shift lever. The gears are of carburized and hardened steel, with the teeth of the sliding gears

rounded to facilitate engagement. The shafts are of alloy steel and are mounted on Timken tapered roller bearings. An oil level is maintained to keep the entire unit properly lubricated.

On the standard unit, the input and output shafts are in line, but when necessary, units can be furnished for right-angle drive. A wide variety of speeds and horsepowers are obtainable for each of the sizes of standard housings.

Allis Air-Break "Explosion-Proof" Motor Starter

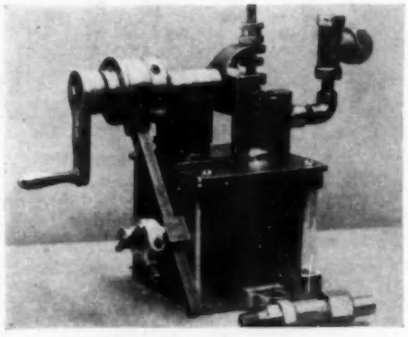
An air-break "explosion-proof" motor starter, known as the Type E, Form AAA, has been developed by the Louis Allis Company, Milwaukee, Wis. This starter is built to prevent the escape of flame from any explosion likely to occur inside the appa-

ratus due to grounds and burn-outs. The starter proper consists of the usual across-the-line, air-break, magnetic contactor with overload and undervoltage protection. Strength to withstand explosions is provided by a very heavy cast-iron case, the cover being held on by 10 heavy capscrews. It is therefore approved for use in Class I. Group D hazardous locations.

Hills-McCanna Improved Lubricators

The "K-K" (Kam-Klutch) drive or the ratchet type of driving mechanism can now be obtained on the lubricator built by the Hills-McCanna Company, 2349 Nelson St., Chicago, Ill. The "K-K" mechanism comprises a right-hand part which attaches to the standard for the purpose of holding the crankshaft when on the back stroke, and a left-hand part which attaches to the driving rod operating the crankshaft on the forward stroke.

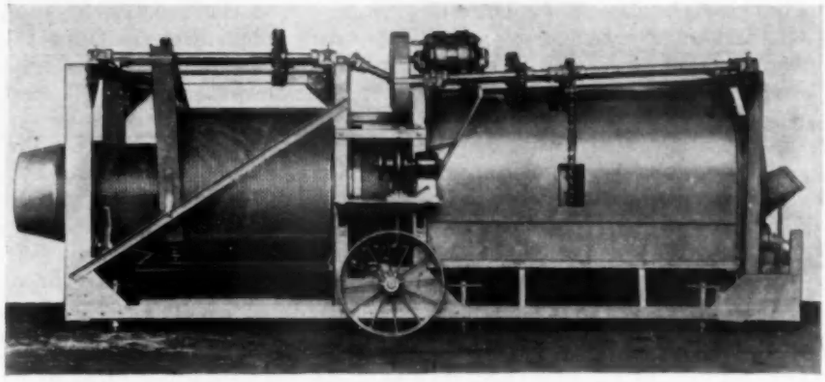
A Kam-Klutch is comprised of spring-held rollers embodied in a



housing to work with and against the crankshaft when operating. The drive permits attachment to the high speed-driving arms in any position within a complete circle, and likewise gives the lubricator greater speed in oil delivery. This drive is interchangeable with the present ratchet drive. Another feature is the improved charging arm or crankshaft for flushing cylinders when starting up or increasing the flow when lubricator is in operation.

"Ideal" Zinc Slinger

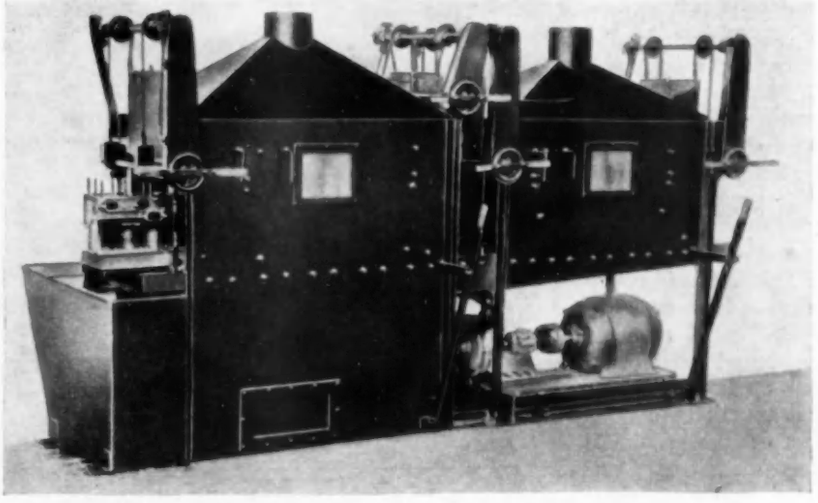
Uniform galvanized coatings, with the excess zinc eliminated, can be obtained on hardware and other parts by the use of the "Ideal" zinc slinger announced by N. Ransohoff, Inc., Cincinnati, Ohio. From the zinc kettles the parts are fed into this machine, the first section of which is a slanting hooded barrel, heated by gas. The barrel is of perforated metal, and its angle is adjustable. It revolves at 50 r.p.m., and as the work moves through, excess zinc is removed and is reclaimed in a chute beneath the hood. Parts travel into a larger drum revolving slowly in water. After the zinc is set, the finished parts are discharged and dry of their own heat. As a result, parts are better finished and elimination of surplus zinc on threaded work can be obtained at increased production rates. All threaded work from $\frac{5}{16}$ x 1 in. to 1 x 24 in., and hardware of different shapes, with and without threads, up to 15 lb. per piece, can be run through the machine.



"Ideal" Zinc Slinger for removing excess zinc from parts up to 15 lb. each

"Ideal" Cylinder-Block Cleaning Machine

Effective cleaning of cylinder blocks before they reach the assembly line is performed by the "Ideal" cleaning machine developed by N. Ransohoff, Inc., Cincinnati, Ohio. The block reaches the cleaning machine riding on a wood pallet on a roller conveyor, and enters a vapor-tight chamber where it encounters an automatic stop. From a large number of nozzles Oleum spirits are sprayed onto and into the casting, the nozzles being so arranged as to register accurately with all the valve holes and with the cylinder bores. The solvent loosens all grease, oil, dirt, chips and other foreign matter. The operator then releases the block, which travels into the next compartment, where a second series of nozzles, similarly placed, direct air into and over the casting, removing the loosened dirt and such excess spirits as may remain in pockets in the casting. The nozzles are so mounted that a lever re-positions the assembly to register with a different size of cylinder block. Thus, two sizes of blocks can be handled by the



"Ideal" Cylinder-Block Cleaning Machine, which performs two operations: first, cleaning the exterior and interior of the casting with Oleum spirits, and second, blowing the loosened material away by means of compressed air

machine without change of equipment.

The cleaning spirits are circulated under a pressure of 35 lb. per sq.in. by a centrifugal pump. A distillation system has been provided so that the contaminated spirits may be cleaned of grease, oil, chips, iron rust, and abrasive materials.

Stephens-Adamson Variable-Speed Drive with Integral Motor

A variable-speed drive, which combines a motor, speed changer, speed reducer, and control in a single housing, has been designed by the Stephens-Adamson Manufacturing Company, Aurora, Ill. This drive is very compact, easily mounted, quiet, and is claimed to be efficient because of the elimination of bearings, couplings, and at least two sets of gear reductions. It is made in sizes to deliver from ¼ to 7.5 hp. to feeders, assembly conveyors, mixers, machine tools, textile machinery, pumps and other applications where variable-speed drive is required.

The unit, as shown in Fig. 2, is a complete drive in itself, and is ready to couple to the machine to be driven. The motor section is usually wound to operate at 1,200 r.p.m. and gives speeds between 24 to 144 r.p.m. or 120 to 720 r.p.m. The output speed is increased or decreased while the machine is in motion by simply turning the small handwheel on top of the housing. The unit can be mounted in any position by means of four bolts.

This drive is essentially the standard "JFS" type of variable-speed reducer with the housing modified to take the body of a standard make of electric motor. The motor armature shaft is extended and forms the high-speed shaft of the speed changer. In this way the usual coupling is eliminated.

Operation of the speed changer section is simple and positive. As shown in Fig. 2, the motor shaft rotates two inner races. These races cause three double conical rollers to rotate slowly in planetary fashion inside the two outer races, which are held from turning. The three planetary rollers drive the variable-speed shaft through a spider. The output speed can be decreased or increased to any rotation by turning the handwheel, which moves the two outer races farther or nearer apart. As the two races approach each other, the three rollers are forced toward the center and in turn push the two inner races apart against heavy springs.

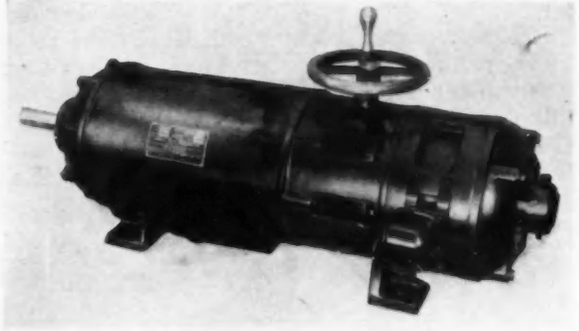


Fig. 1—Stephens-Adamson Variable-Speed Drive, consisting of a variable-speed reducer, electric motor and speed control in single housing

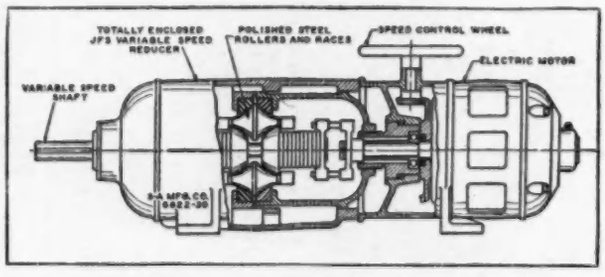


Fig. 2—By turning the handwheel, the rotation of the variable-speed shaft of the Stephens-Adamson Variable-Speed Drive can be regulated to any speed wanted

"Chemical" Automatic Metallographic Polishing Machine

Polishing of metallographic specimens on the automatic machine developed by The Chemical Rubber Company, Cleveland, Ohio, is not dependent upon the operator's ability. It automatically produces a plane surface with a high quality polish. The machine consists essentially of a polishing disk mounted horizontally on a duraluminum casting. This casting is attached rigidly to a cast-iron table. The polishing disk is belt driven by means of a ¼-hp. motor and rotates at 400 r.p.m. Passing vertically through the shaft carrying the polishing disk is a second spindle, to which is attached an eccentric gear as shown in Fig. 2. This eccentric gear drives the specimen holders, of which there are three, in such a way that the specimen is slowly moved back and forth along the radius of the turning disk. At the same time the specimen is

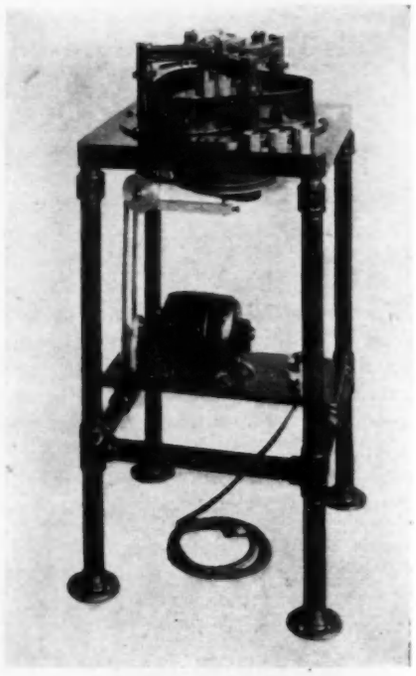


Fig. 1—"Chemical" Automatic Metallographic Polishing Machine for specimens up to 1 in. in diameter and 1 in. high

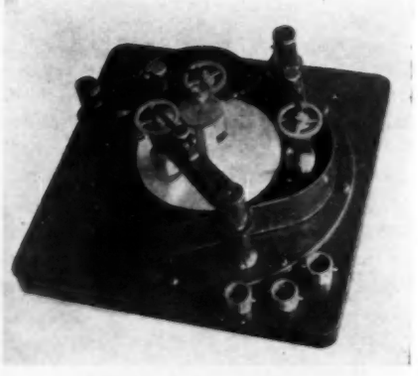


Fig. 2—Showing the three specimen arms and sleeves together with the polishing disk

rotated slowly so that the direction of polishing is changed continually. By means of a gearbox having a ratio of 100 to 1, the specimen is caused to revolve at 4 r.p.m. This rotating movement of the specimen prevents pitting and the formation of "comet tails" at inclusions.

In this machine all specimens must be mounted. The holders in Fig. 2 accommodate specimens up to 1 in. in diameter and 1 in. high.

Specifications: Floor space, 22x22 in.; height over-all, 43 in.; diameter of disks, 9 in.; net weight, 180 lb.

Leitz Improved Micro-Metallograph

Heavier design to give increased rigidity is now employed in the micro-metallograph built by E. Leitz, Inc., 60 East 10th St., New York, N. Y. The object stage is of increased dimensions, and because of its solid mounting to the microscope, affords correct mechanical motion to the specimen. The fine adjustment is encased in a separate housing protecting the micrometer screw from thermal efforts to insure maintaining the focus of the objective.

By employment of Periplan eyepieces, increased flatness of the micro-image is obtained. A special optical unit is built into the vertical illuminator. The iris diaphragm, after being placed off-center for oblique illumination, may be rotated so that the angle of obliquity may be made to exist at any azimuth. Thus, adjusting the azimuth of the illumination with respect to the direction of the specimen structure, is made possible.

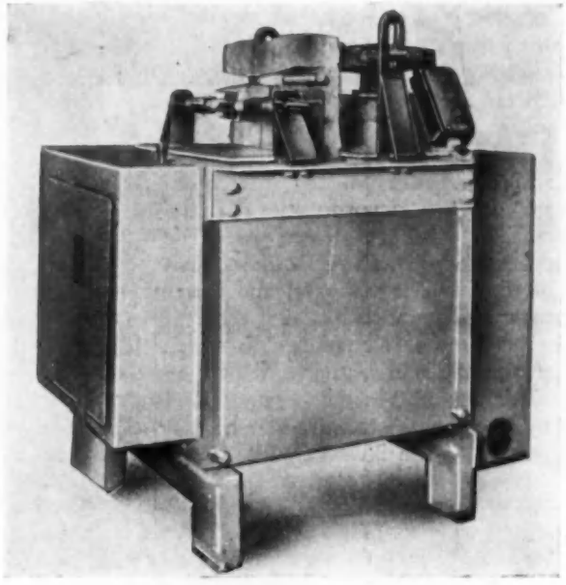
The Leitz Micro-Metallograph can also be used for photographic study under transmitted, ordinary or polarized light.

Berwick No. 4, Type E, One-Electrode Metal Heater

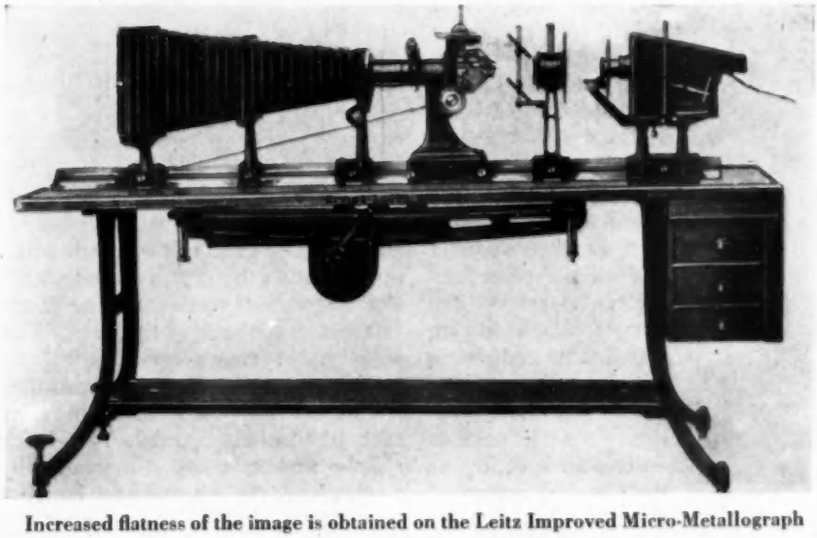
Perfect visibility of the piece of steel being heated is the salient feature of the one-electrode No. 4, Type E metal heater announced by the American Car & Foundry Company, 30 Church St., New York, N. Y. This heater employs four points of contact, the material resting on the lower electrode, and being grabbed by overhanging jaws of a parallel electrode. The arrangement is such that, besides end heating, any length of heat desired can be obtained at any spot on the bar or rod, the length of heat being approximately 8 in., but this can be varied. The heater, as constructed, will heat any diameter from $\frac{3}{8}$ up to 2 in.

The heat on an electric heater of this type is located entirely between the contact points of the jaws. The balance of the material does not get hot until after the current has been cut off, or the piece removed.

As all of these heaters are specially constructed for the class of work they do, it is necessary that the manufacturer be supplied with definite information, not only as to the diameter and the length of heat desired, but also the hourly production required before definite figures can be given. On most heating jobs, however, the electrical consumption is between 18 and 20-kwh. per hundred pounds of metal heated. All electrical components are enclosed in sturdy housings, and the entire unit is supported by a heavy angle-iron frame.



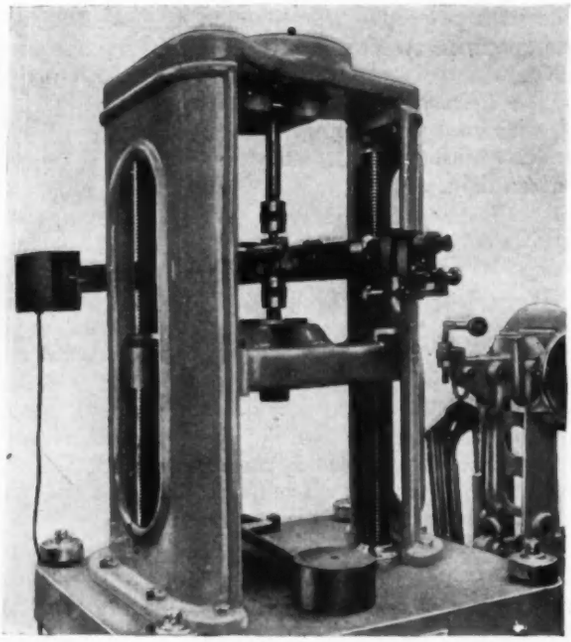
Berwick No. 4, Type E, One-Electrode Metal heater for work from $\frac{3}{8}$ to 2 in. in diameter



Increased flatness of the image is obtained on the Leitz Improved Micro-Metallograph

Riehle-Sayre Mirror Extensometer

Routine testing of 1-in. tension test specimens of 2-in. gage lengths can be done with the "Riehle-Sayre" mirror extensometer announced by Riehle Bros. Testing Machine Company, 1424 North Ninth St., Philadelphia, Pa. It permits a semi-production basis of the reading of high-precision extensometer measurements, where the unit strain at the proportional limit is often below one part in a thousand. By the use of a system of four prisms two ends are gained:

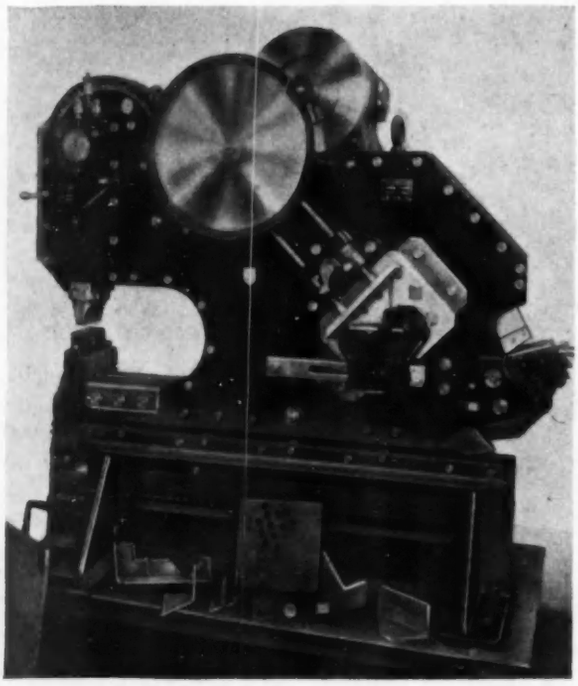


Riehle - Sayre Mirror Extensometer equipment set up on a test specimen

First, elongations on both sides of the specimen are averaged automatically, and second, any movement or vibration of the specimen is automatically cared for. Optically, the instrument consists of a telescope with a horizontal cross-bar supported on a bracket, a system of four prism mirrors on a light weight extensometer attached to the test specimen, and an illuminated scale supported at a fixed distance from the test specimen on the opposite end of the bracket from the telescope. The upper two prisms are fixed in position during the test and the lower prisms are supported so that they tilt as the test bar elongates. Readings may be taken directly to 1 part in 100,000 on a 2-in. gage length and may be estimated to a fraction of that figure with the illuminated scale.

"G.D.S." No. 210 Quadruple Universal Punch, Shear, and Notcher

Direct-coupled electric motor drive is employed in the No. 210 shearing and punching machine announced by the G.D.S. Shearing & Punching Machine Company, 2 Lafayette St., New York, N. Y. The frame is made of rolled Siemens-Martin steel plate. The machine combines the universal punch and shear with a built-in notcher. The last can also be provided with a die stamping device, which enables square and rectangular holes to be made in the web of channel and I-beam sections.



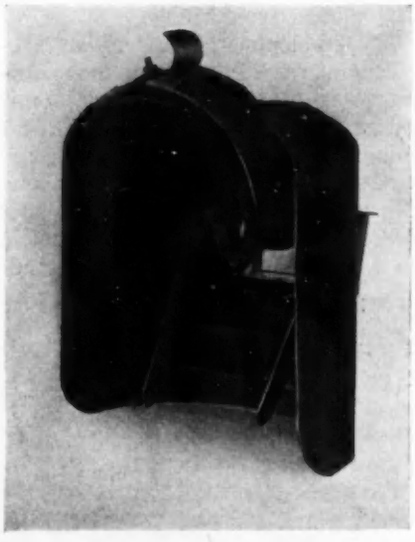
"G.D.S." No. 210 Punch, Shear, and Notcher

This machine will shear plates of any length or width, cut angles and tees square and on the miter, cut rounds, squares and flats, notch angles, tees, beams and plates, without changing blades. The full-floating punch permits automatic spotting of the punch, a feature of operating convenience. Four sizes are manufactured, that is, Nos. 8, 10, 13, and 16, to shear plates $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ in. thick. The bar-cutter will handle rounds up to 1, $1\frac{3}{16}$, $1\frac{1}{2}$ and 2 in. on the respective sizes.

Schirmer Welder's Helmet

A welder's helmet, of which the eye panels can be operated by movement of the wearer's chin, has been developed by William Schirmer, 1318 E. Roosevelt St., Phoenix, Ariz. A black fiber mask carries the metal eye-panel, opening upward on spring hinges. Inside the mask, a padded chin pedal operates an expansion lift-bar, which folds up. Movement of the chin downward unfolds the bar and elevates the eye panel to the exact point desired by the operator. When fully opened, the panel locks in position and remains fixed until released by a metal finger trip located on the outside of the mask. The eye panel is devised to take two glasses, either slipped in from the end or tightly secured by two setscrews.

The helmet is adjustable at three points and may thus be made to fit



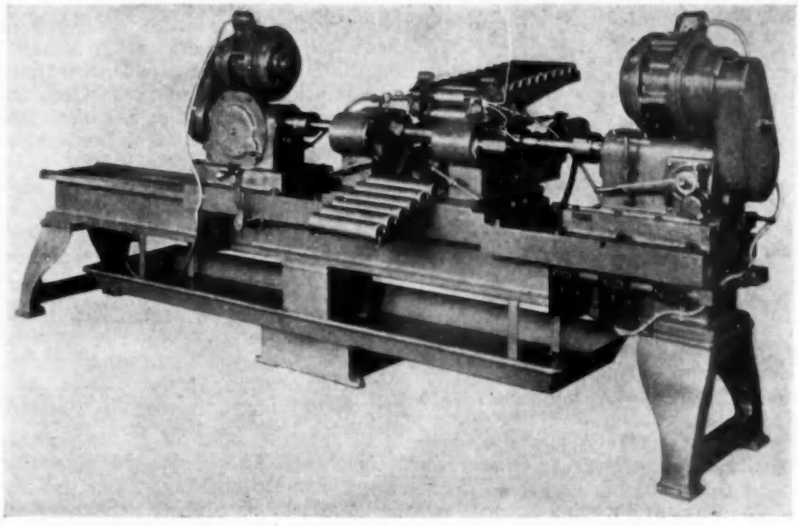
any head. The metal head band, hinged above the ears, is fitted with a slot and thumb screw, making it adjustable at the back of the head. The soft leather crown piece is in two sections, cross-laced for adjustment. The most important adjustment is that of the chin pedal, this being simply and effectively managed by suspending the chin piece between two flat metal check bars.

EQUIPMENT ADAPTATIONS

RECENTLY DEVELOPED BY THE MAKERS

Bradford Two-Way Drilling Machine for Conveyor Rolls

A double-end reaming and chamfering machine for conveyor rolls has been developed by the Bradford Machine & Tool Company, 657 Evans St., Cincinnati, Ohio. These rolls have an outside diameter of $2\frac{1}{2}$ or 3 in., and they vary in length from 6 to 48 in. All sizes are reamed 1.580 in. with a $\frac{1}{16}$ in. chamfer.



Operating cycle of six seconds is obtained on the Bradford Double-End Reaming and Chamfering Machines for Conveyor Rolls

Two No. 5 Bradford automatic, single-spindle drill heads are mounted on the machine to work in conjunction with an automatically controlled magazine fixture. Half of the fixture and one head are mounted in a fixed position on the bed, while the other half of the fixture and the other head are slidably mounted to accommodate the various lengths of rolls. All movements of the machine are fully automatic, and an operator is required only for inspection.

Control of the motors operating the two drill units and also the motor controlling the coolant supply system is obtained through a single push button. Independent switches with overload and underload protection are provided for each motor.

The operator throws the feeding mechanism of the master head into engagement by lifting the lever shown on the side of the right-hand unit. The cam on this head actuates an automatic control valve, which in turn opens the air supply line. Compressed air passes to the cylinders controlling the transfer fingers of the magazine. As these fingers advance, they carry one roll into the working position.

When the pistons operating the transfer fingers reach the completion of their strokes, the air supply is by-passed through a port in the cylinders, and the air actuates two cylinders at the front of the fixture. These cylinders act through a simple beam arm to operate the bellmouth bushings, which centralize and clamp the work in position. During this period also, the air supply is passed to an air-operated tripping unit attached to the feed lever of the second drill head. As the clamping of the part is completed, the spindles of the drilling units advance in rapid traverse, slow down to a feeding rate of 0.040 in. per revolution for the reaming operation, and again slow down to a feed of 0.005 in. per revolution for the chamfering operation, after which both spindles return in rapid traverse to the starting point. Then, the cam on the master head again actuates the automatic control valve, cutting off the air supply and opening the feed lines of the fixture to the exhaust.

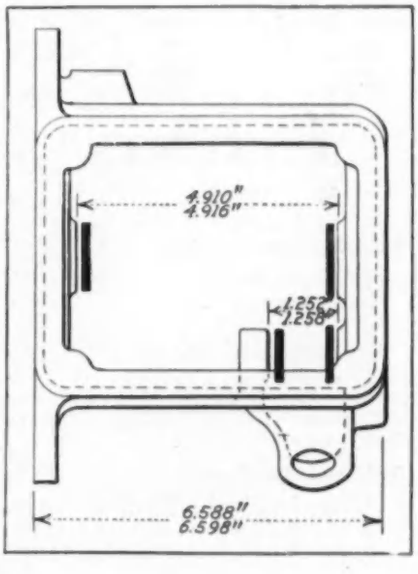
The transfer fingers are carried back to the starting point by means of a spring return, after which the clamping cylinders are opened by the exhaust, thus permitting the bellmouth bushings to return to their neutral position, ejecting the finished part from the fixture.

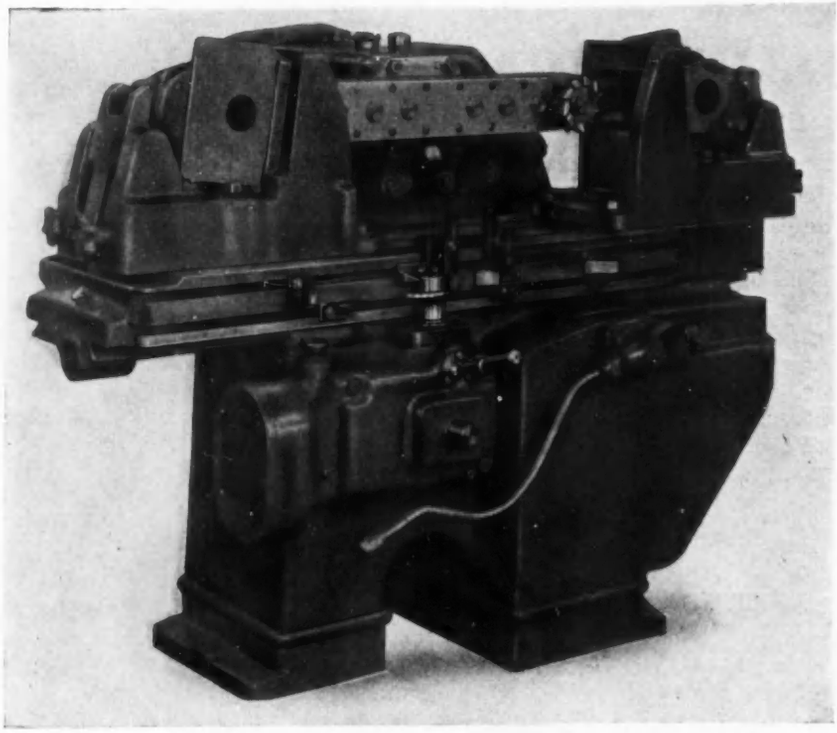
The reamers are operated at a cutting speed of 100 ft. per minute, and the operating cycle of the machine is 6 seconds.

Although this machine is tooled up specifically for the production of conveyor rolls, it is adaptable for the production of parts requiring a double-end machining operation, and which are of such a design as to permit the use of magazine feeding.

Extension Attachment for Milling Internal Bosses

Four inside bosses on the transmission case of a European automobile are milled on the 24-in., plain, wide-bed, automatic milling machine, built by the Cincinnati Milling Machine Company, Cincinnati, Ohio. It is equipped with an automatic two-way or reciprocating feed cycle, and





Production of 88 transmission cases milled on four internal bosses is obtained per hour on this Cincinnati Plain Automatic Milling Machine

has a special milling attachment. The attachment consists of a long extension with a gang of cutters mounted on each end. Each cutter is driven by a train of gears inclosed in a steel bar. One transmission case is held in a special fixture on each end of the machine table. While one piece is being milled, the operator reloads the idle fixture.

The machine cycle is entirely automatic, but a safety stop is incorporated to prevent the table from advancing directly from one cut to the other should the operator be late in loading. Feed of 4 in. per min. is used.

PATENTS

DECEMBER 16, 1930

Metal-Working Machinery

Flanging Machine. Douglass E. Stevens, Denver, Colo. *Patent 1,785,537.*

Molding Machine. Thomas O. Morris, Easton, Pa., and John J. Lawlor, Plainfield, N. J., assigned to Automatic Molding Machine Corporation. *Patent 1,784,995.*

Tools and Attachments

Differential Chuck. Joseph E. Regan, West Hartford, Conn., assigned to The E. Horton & Son Co. *Patent 1,784,908.*

Tool-Retaining Device. Michael J. Schlitters, Jr., and Stanley Imerman, Detroit, Mich. *Patent 1,784,911.*

Cutting and Welding Torch. Alexander F. Jenkins, Baltimore, Md. *Patent 1,784,964.*

Die Mechanism. Charles Fassinger, Pittsburgh, Pa., assigned to Oliver Iron & Steel Corporation. *Patent 1,785,116.*

Mechanism for Forming Lock Washers. Carl G. Olson, Chicago, Ill., assigned to Shake-proof Lock Washer Co., Inc. *Patent 1,785,281.*

Precision Gage. William Jandus and Herbert S. Jandus, East Cleveland, Ohio. *Patent 1,785,583.*

Punch and Die Retainer. Clement C. Richard, Detroit, Mich., assigned to Allied Products Corporation. *Patent 1,785,495.*

Furnaces

Furnace and Conveyor Therefor. Ralf S. Cochran, Toledo, Ohio, assigned to The Surface Combustion Co. *Patent 1,784,812.*

Processes

Method of Strain Hardening Manganese Steel. Frank A. Fahrenwald, Chicago, Ill., assigned to American Manganese Steel Co. *Patent 1,784,865.*

Method of Strain-Hardening Steel. Frank A. Fahrenwald, Chicago, Ill., assigned to American Manganese Steel Co. *Patent 1,784,866.*

Process of Welding Drills. Frank O. Hoagland, Hartford, Conn., assigned to Pratt & Whitney Co. *Patent 1,784,987.*

Tank for Chromium Plating. C. Roy Gleason, Chicago, Ill. *Patent 1,784,987.*

Method of Making Brake Bands and the Like. Thomas M. Russell, Middletown, Conn., assigned to The Russell Manufacturing Co. *Patent 1,785,391.*

TRADE PUBLICATIONS

ALUMINUM, ELECTROPLATING OF. The Aluminum Co. of America, Pittsburgh, Pa., has brought out a pamphlet entitled "Electroplating Aluminum," covering the procedure for various aluminum alloys and showing many typical products.

BORING MACHINE, JIG. The R. Y. Ferner Co., Investment Bldg., Washington, D. C., American representative of the Société Genevoise D'Instruments de Physique of Geneva, Switzerland, has issued Bulletin No. 527, describing a new model of Swiss high-speed precision jig borer, type MP-3C. A second catalog, No. 518, illustrates and describes a form of heavy support for measurements and inspection work by means of the Société Genevoise microindicator.

GRINDER, CAR-WHEEL. The Norton Co., Worcester, Mass., has issued a bulletin on its 44-in. car-wheel grinder described recently in these pages. More complete information is given, of course, together with specifications.

HOISTS. The Union Manufacturing Co., New Britain, Conn., has published a booklet illustrating roller-bearing, spur-geared, twin-hook, Army-type, quick-acting, and differential hoists, together with trolleys.

LATHES, BUFFERS AND GRINDERS. The J. G. Blount Co., Everett, Mass., has issued Catalog No. 24, comprising four sections on respectively "Wet Tool Grinders, Belt and Motor Driven Types"; "Buffers — Grinders, Belt Driven Types"; "Buffers—Grinders, Motor Driven Types", and "Speed Lathes—Belt and Motor Driven Types."

MOTORS. The Reliance Electric & Engineering Co., Cleveland, Ohio, has available Bulletin No. 207 on Type T, heavy-duty planer motors for reversing service.

REFRACTORIES. The Laclede-Christy Clay Products Co., St. Louis, Mo., has informed us that the U. S. Department of Commerce, Bureau of Mines, Pittsburgh, Pa., is distributing, rental charge free, a three-reel film in 35 mm. and 16 mm. sizes for stationary or portable projectors, the subject, No. 97, being "Story of Fire Clay Refractories." It has recently been revised and deals with the manufacture and application of fire clay products.

NEWS OF THE WEEK

Census Data on Small Tools Released by Bureau

WASHINGTON, D. C., Dec. 31, 1930.—The Bureau of the Census announces that, according to a preliminary tabulation of data collected in the Census of Manufactures taken in 1930, the total value (at f.o.b. factory prices) of machine-tool accessories and small metal-working tools manufactured in the United States in 1929 amounted to $166,537,066. Of this total, $111,833,929 was contributed by attachments and fixtures and $54,703,137 by small tools. The leading item is $44,814,512, representing the value of subpresses, punches, dies, and similar tools. Of the total, $134,194,194 was reported by establishments engaged primarily in the manufacture of machine-tool accessories and small metal-working tools, and the remaining $32,342,872 represents the value of such accessories and tools made as secondary products by establishments engaged primarily in the manufacture of machine tools and of stamped ware, enameled ware, metal stamping, and similar products.

This industry, as defined for census purposes, embraces establishments whose principal products are twist-drills, reamers, milling cutters, taps, and dies, and establishments specializing in the building of dies, jigs, fixtures, and special tools. It is understood that a considerable amount of such products are manufactured in establishments engaged primarily in the manufacture of machine tools and in the commercial metal-stamping industry.

Statistics for this industry are presented at this census for the first time. The establishments which are classified herein were previously classified in the following industries: Cutlery and edge tools, machine tools and metal-working machinery, and foundry and machine-shop products, but no comparable data are available for previous censuses.

Statistics for the industry are summarized in Table I, and detailed statistics on the production of machine-tool accessories and metal-working tools in all industries are shown in Table 2. The figures are preliminary.

TABLE I—SUMMARY FOR THE INDUSTRY

	1929	1929
Number of establishments		722
Wage earners (average for the year)[1]		26,619
Wages[2]		$51,093,532
Cost of materials, containers for products, fuel, and purchased electric current[3]		$28,154,009
Products, total value[3]		$144,410,932
Machine-tool accessories and small metal-working tools		$134,194,194
Other products, and receipts for contract work and repairs		$10,216,738
Value added by manufacture[3]		$116,256,923

[1] Not including salaried employees. The average number of wage earners is based on the numbers reported for the several months of the year. This average somewhat exceeds the number that would have been required for the work performed if all had been continuously employed throughout the year, because of the fact that manufacturers report the numbers employed on or about the 15th day of each month, as shown by the pay rolls, usually taking no account of the possibility that some or all of the wage earners may have been on part time or for some other reason may not actually have worked the entire month. Thus in some cases the number reported for a given month exceeds the average for that month.

[2] Manufacturers' profits can not be calculated from the census figures because no data are collected for certain expense items, such as interest on investment, rent, depreciation, taxes, insurance, and advertising.

[3] Value of products less cost of materials, containers for products, fuel, and purchased electric current.

TABLE II—MACHINE-TOOL ACCESSORIES AND SMALL METAL-WORKING TOOLS—PRODUCTION, BY CLASS AND VALUE: 1929

Class	1929
Machine-tool accessories and small metal-working tools made in all industries, aggregate value	$166,537,066
Machine-tool accessories and small metal-working tools made in the industry	$134,194,194
Made as secondary products in "Machine Tools" and "Stamped ware, enameled ware, and metal stamping, enameling, japanning, and lacquering" industries	$32,342,872
Attachments and fixtures, total value	$111,833,929
General equipment:	
Chucks (lathe)	2,124,300
Chucks (drill)	1,229,075
Jaws (face plate)	88,512
Vises (machine)	23,009
Other (specify)	946,069
Special equipment:	
Jigs and fixtures	17,805,197
Punch-press equipment:	
Subpresses, punches, dies, etc	44,814,512
Die-casting and drop-forging dies	1,176,852
Tools for screw and automatic machines:	
Box tools, hollow mills, work and tool holders, etc	926,071
Specially designed tools	4,964,562
Special machinery	4,306,101
Special order work not reported by kind	31,426,539
Other attachments and fixtures	2,003,130
Small tools, total value	54,703,137
Arbors and collars	59,670
Collets	206,904
Counterbores	1,116,253
Countersinks	64,702
Drills (carbon)	4,079,714
Drills (high speed)	9,881,545
Hobbing cutters (high speed)	1,238,989
Lathe tools (carbon)	457,177
Lathe tools (high speed)	648,231
Milling cutters (carbon)	306,650
Milling cutters (high speed)	6,338,425
Reamers (carbon)	3,031,678
Reamers (high speed)	4,842,321
Threading tools:	
Taps and dies (not pipe threading):	
Taps (carbon)	2,694,388
Taps (high speed)	2,307,964
Dies (carbon)	1,146,089
Dies (high speed)	1,168,776
Chasers	1,675,134
Pipe threading:	
Taps	287,981
Dies	1,201,050
Pipe stocks complete with dies	2,338,328
Other small tools	7,742,731
Precision measuring tools and gauges	1,785,519
Other measuring tools	82,918

THE next Lyons (France) International Fair will take place from March 2 to 15, 1931.

Standards News

The formation of two technical groups of the Sectional Committee on Small Tools and Machine Tool Elements to formulate standards for splines and splined shafts is announced by the A.S.A. R. E. W. Harrison, Chief Engineer of Cincinnati Grinders Incorporated, will be chairman of the committee appointed to undertake the development of spline standards suitable for the machine tool industry. Another committee under the chairmanship of W. L. Barth, Standards Engineer of the General Motors Corporation, will develop spline standards for the automotive and aeronautical industries. The committees will act independently of each other, although the recommendations of both will be submitted for approval. C. W. Spicer, representing the S.A.E., is chairman of the general committee.

Previous attempts to standardize splines have been restricted to the fitting or soft broached hole, certain factors in all spline applications having been considered too variable to permit similar standardization in the mating part, or shaft. Recently a reversal of this opinion has been observed through the standards on the subject developed by the General Motors Corporation and the British Engineering Standards Association, both of which establish definite dimensional limits for both the fitting and the shaft. The committee plans to follow this latter precedent to permit greater freedom in the development of the standards and, further, will disregard, for the present, the existence of patents which might be thought to affect methods of spline manufacture. Multiple splines of large diameters are also to be considered by the committee.

A proposed American Standard for machine pins of the cylindrical and taper types has been prepared by a technical committee of the A.S.A. and is now being circulated for review and criticism. Copies may be secured from the A.S.A. Information Service, 29 West 39th St., New York City. The draft proposal covers a diameter range of taper pins from $\frac{1}{8}$ to $1\frac{1}{2}$ in. and a length range of $\frac{1}{2}$ to 12 in. The committee has reduced the number of keys now stocked from 173 to 143 and at the same time provided suitable size ranges. The proposed standard retains the present taper of $\frac{1}{4}$ in. per ft. of length and designates the size of pin from the diameter of its small end, a practice which has been adopted by the standardizing bodies of several countries of Europe. The small diameter of the pins is in the usual fractional dimensions, spaced by thirty seconds from $\frac{1}{8}$ to $\frac{5}{8}$ in. diameter, by sixteenths to $\frac{3}{4}$ in. diameter, by eighths to $\frac{1}{4}$ in. diameter, and by quarters to $1\frac{1}{2}$ in.

diameter. The number of diameters is reduced from 20 to 14 with a better spacing of sizes. Ends of the pins have been rounded to facilitate driving, to lessen the possibility of cutting, to prevent deformation of the side bearing surface, and to make it unnecessary to drive the pins to such an exact location in their places as pins with sharp, distinct edges. Among the objectionable features eliminated or minimized are the present arbitrary numerical symbolization which has no direct mathematical relation to the actual size of the pin; the irregular progression from one size of pin to another; adoption of large diameter as a basis for size designation.

The proposed standard for cylindrical pins is intended to cover the requirements of machine pins used as rod-end pins, pivots, dowels, journals, idler pins, locating pins, cam roller pins, short axles, and others, which are not standardized to any extent in this country. The suggested series includes 94 sizes. The diameters and lengths of cylindrical pins vary in much the same way as diameters and lengths of taper pins, except that the maximum length is given as 8 diameters instead of 12.

A revised draft of the proposed American Standard for fabrication of hangers, supports, anchors, sway bracings, and vibration dampeners, prepared by the A.S.A., is now being circulated for comment and criticism.

The Outlook for 1931

GERARD SWOPE

President, General Electric Company

IT IS always difficult to look ahead, and particularly so this year.

We, in the electrical industry, possibly have had more to be thankful for during the past year than those in many other lines of endeavor, and this may also be true of what the future holds for us. New methods in industry, with electricity as their bases, are being continually introduced; new uses are constantly being found for electrical apparatus and appliances in the home and new devices are being developed to meet these needs. The statistics of the electric light and power companies throughout the United States for 1930 reflect these tendencies, showing that there has been but a slight decline in the use of electric power by commercial organizations and in industry, and that the electric energy used in the homes, even in this year of depression, has increased over last year.

We expect this course to continue, and therefore look forward with confidence, believing that the electrical manufacturing business, as a whole, in the new year should surely be no worse and possibly somewhat better than in 1930.

SAFETY measures in railroading and in industry generally will be discussed in San Francisco on Jan. 19 when more than 250 safety experts from all parts of the West gather there for the annual Pacific Coast Regional Meeting of the Safety Section of the American Railway Association. J. B. Monahan, Supervisor of Safety for the Southern Pacific Co., has been appointed chairman for the meeting by H. A. Rowe, Association president.

Trinidad, too, uses pressure vessels

Normal Return to Sound Business Can Be Expected

F. A. MERRICK

President, Westinghouse Electric & Manufacturing Company

THE year drawing to a close has presented a progressively disappointing picture for commerce and industry in general. Following the stock market break in October, 1929, the high tide of business receded rather quickly to a level which was almost universally accepted as the base line to be expected for the current course of things until the upturn came in sight. This view was encouraged by several favorable factors present which have not usually been found in similar situations. Prominent among these were the plentiful money supply and the general absence of swollen inventories. Existing inventories, however, were then judged in relation to past consumption, and when the stock markets began their pronounced downward slide in midsummer of this year and customer buying was abruptly curtailed in consequence, the inventories loomed larger and prices of all commodities yielded, bringing the result of added stagnation through the natural timidity of purchasers in a falling price market.

The electrical manufacturing industry suffered with all others in this series of changes, except in so far as work on larger types of equipment, requiring considerable time for fabrication, held up the level of employment during the greater part of the year.

While the short-time outlook in the industry thus shows a much lower trend than has been the case in recent years, there are many aspects of the situation that promise improvement—the extension of electrical service to the farms of the country is progressing with increasing rapidity—there are important projects of electrification of transportation systems, some now under way and others approaching maturity—many of the important lines of industry are embracing this period of relatively slack business to rehabilitate their plants on most modern efficient basis which generally means increased electrical equipment—all branches of Government, Federal, State, and Municipal, are joining in an effort to advance construction of useful public works—and even under present conditions there is ground for expectation that the use of electricity in the households of the country will be accelerated throughout the coming year, with attendant market for the appliances which will create this added use.

And beyond all this is the basic fact that goods in the hands of the public are daily being consumed, that the shelves of the dealers are being cleaned up and the stocks of distributors lessened—thus the fundamentals of a normal return to sound business in all lines are working themselves out as must ever be the case.

This is too large and too fundamentally prosperous a country to stand still for any long period.

Soviet Trade Report Shows High Purchases

More than four-fifths of Soviet purchases in the United States, totaling $149,223,000 during the fiscal year 1929-30 which ended Sept. 30, consisted of industrial and agricultural machinery, according to a statistical analysis appearing in the latest number of the Economic Review of the Soviet Union, published by the Amtorg Trading Corporation. Soviet purchases in the United States in 1929-30 were 38.6 per cent greater than in the preceding twelve months and three times those of five years ago. During the seven years since the resumption of regular trade transactions Soviet-American trade turnover totaled $750,777,000, of which four-fifths was made up of purchases of American products and one-fifth sales of Soviet products in this country. According to the article, during the seven years the balance of trade in favor of the United States equalled $448,000,000.

The article follows in part: "The main exports from the United States to the Soviet Union are industrial and agricultural machinery and certain raw materials, mainly cotton and non-ferrous metals. Agricultural machinery and supplies constituted the largest group of purchases made in 1929-30, the gain recorded during the year in this group being 139 per cent over the preceding year.

"Purchases of industrial machinery and equipment during the past fiscal year increased 51.5 per cent over the preceding year, amounting to $46,050,000, as compared with $30,337,000 in 1928-29, and $11,395,623 in 1927-28—a fourfold increase during the past three years. . . . . The Soviet Union was third in purchases of American industrial machinery in the calendar year 1929. In 1925, the U.S.S.R. ranked fourteenth.

"The principal Soviet purchasers of American industrial machinery and equipment are the machine-building (mainly automobile and tractor), and metallurgical industries. Purchases for the machine building industry in 1929-30 increased 218 per cent over 1928-29 and amounted to $18,297,000. . . . . Purchases for the metallurgical industry were 349 per cent greater in 1929-30 than for the previous year and totaled $5,682,000."

In the following table, detailed figures for metal-working purchases made during the past two fiscal years are given:

Industrial Equipment	1929-30 (In Thous.	1928-29 Dollars)	Per Cent Chge.
Metal manufacturing industry	2,236	4,249	—47.8
Machine building industry	18,279	5,748	+218.0
Mining industry	1,751	1,392	+25.8
Oil industry	8,154	9,824	—16.9
Electro-technical industry	1,449	195	+643.1
Chemical industry	1,279	976	+31.0
Post, telegraph and telephone equipment	1,360	260	+423.1
Food industry	1,368	396	+175.8
Shipbuilding and marine equipment	1,419	1,416	+ 0.2
Miscellaneous	3,073	4,518	—31.9
Total	46,050	30,337	+51.5

Government to Spend Large Sums for Mississippi Levee Work

PAUL WOOTON
Washington Correspondent

WASHINGTON, D. C., Dec. 27—As the result of an expedited Rivers and Harbors and Flood Control program provided for in the War Department and emergency construction appropriation bills, the government and private contractors are faced with the necessity of spending large sums for mechanical equipment. Plans already completed call for the expenditure of $3,000,000 by the government during the next year for new plant and repairs. In addition, it probably will be necessary to spend $2,500,000 for new equipment for work on the Missouri river. It is estimated that contractors regularly engaged in river work will spend several millions for new equipment.

Because of the limited field of the river work and the high unit cost of the equipment used, government engineers have experienced some difficulty in interesting the machinery industry in research work for the purpose of devising better methods. It is pointed out that there has been little basic improvement in levee machines and pipe line dredges within the past ten years while the perfection of road building equipment has forged ahead steadily. Since the river work is more specialized than highway work, proposals have been submitted to the War Department for the setting aside of a definite fund to be used in field research work. The Secretary of War is now considering this suggestion.

The War Department does not propose to compete in any way with private industry in mechanical research work. This has been made clear by the Secretary of War. At the same time, the Secretary has been impressed with the necessity for closer co-operation between the government and the industry in the designing of equipment. Such co-operation would embrace field research work by the War Department as the basis of more complete and practical operations in the factory. The army engineers are in charge of all of the river work and do a certain part of it with their own plant through the employment of day labor. As they draft the specifications for the operations they are better suited than private contractors for suggesting new ideas. In some cases, contractors seeking to introduce new equipment have encountered difficulties in complying with specifications. It is a policy of the War Department to do from ten to fifteen per cent of the river work with its own plant. A certain amount of research work has always been carried on by the army engineers. It is believed, however, that this work could be made more effective if a definite sum were set aside to finance it.

Increased attention is being given by the War Department to the mechanical side of the work. Engineer officers have issued instructions that efforts shall be made to add more mechanical engineers to the civilian force maintained in the various districts along the Mississippi system. Instead of turning entirely to civil engineering schools for recruits to the staff, those in charge of the district offices are requested to obtain the services of a certain number of graduate mechanical engineers. Not only in the design of new equipment is the need for more mechanical engineering aid felt. It has been found that great improvements have been made in maintenance methods by building up the mechanical engineering side of the personnel.

Of the $3,000,000 that the government has definitely decided to spend on equipment this year, $300,000 will be used for repair work. The balance will be spent in the purchase of six new dredges. An amount of $2,500,000 probably will be spent for the purchase of four new dredges for the Missouri. It is not the policy of the War Department to make a separate allocation of its funds for the purchase of new equipment. Each of the field districts recommends the purchase of new equipment based on the amount of work that it will do. This equipment is charged up to the various projects. It is apparent, therefore, that considerably more than $7,000,000 will be spent on new equipment this year by the government and contractors. It is estimated, for instance, that the War Department will spend in excess of $100,000 just for tractors. As far as the private contractors are concerned, word has recently been received that one contractor alone has just spent $250,000 for two new 150-ft. tower machines to be used on levee work. One of these tower machines is a straight electric drive affair, obtaining its current from power lines in the vicinity where it is working.

THE American Society of Agricultural Engineers, at a recent meeting in Chicago, accepted a revised and enlarged set of power take-off standards and recommended practices which had been in process of development for some time.

Machinery Tariffs Under Discussion By European Countries

FRANCIS MILTOUN MANSFIELD
Paris, France

WHY not reduce customs tariffs by groups of products? This was the monkey-wrench thrown by Great Britain into the cogs which made the wheels go round at the recent conference of the League of Nations, where a formula for concerted economic action was being sought. Delegates of 27 nations had assembled to discuss the means by which such action might be brought about.

We may take it that primarily the whole project, whether the Conference admitted it or not, was a case of pitting the Old World against the New. The first barrage was laid down by the seven agricultural states of Central Europe when they espoused a free trade policy among themselves for their agricultural products.

Great Britain, standing apart from Continental Europe, through the spokesman of the British Government, stated that it was not at all in favor of groups of countries abolishing or reducing tariffs as between themselves. This, since it applied to the European cereal-producing states, was at least a kindly thought for Britain's dominions. The United States only had an observer from the Consulate at Geneva, but Great Britain stood out boldly for her wards.

As an alternative and suggested practical method by which a reduction of customs tariff could be brought about, and in order that the problem should be kept within manageable limits, the British Government proposed that negotiations should proceed by stages, a few groups of commodities at each step. The first proposed was machinery, which should be earmarked for a tariff reduction of an agreed-upon percentage, that should not exceed say 5 per cent on goods falling within the particular group in question. This 5 per cent was to be deducted from the conventional tariff, or those in force under "most favored nation" treatment, where such existed.

The point of *groups of commodities* was emphasized by Great Britain as to tariff reductions between groups of nations, thus combining the two methods though opposing the latter by itself..

Great Britain's attitude on this particular issue, machinery, is expressed in figures as follows, being her exports of the last fiscal year:

Country	Value in Dollars
Germany	$8,775,000
Austria	430,000
Belgium	7,000,000
France	15,400,000
Hungary	320,000
Italy	5,500,000
Holland	12,000,000
Poland	3,700,000
Switzerland	1,170,000
Czechoslovakia	1,425,000
Yugoslavia	500,000

Germany, as the European country next in line to benefit from any such arrangement, has a trade export schedule as follows:

Country	Value in Dollars
Austria	$11,300,000
Belgium	10,025,000
France	19,675,000
Great Britain	14,475,000
Hungary	4,650,000
Italy	15,000,000
Holland	20,500,000
Poland	16,000,000
Switzerland	11,500,000
Yugoslavia	6,080,000
Czechoslovakia	16,375,000

The outcome of the Geneva Conference was a draft convention, drawn up as completely as possible, and agreed upon by the delegates of the various nations represented—Germany, Austria, Belgium, Great Britain, Bulgaria, Denmark, Spain, Esthonia, Finland, France, Greece, Hungary, Irish Free State, Italy, Latvia, Lithuania, Luxembourg, Norway, Holland, Poland, Portugal, Rumania, Sweden, Switzerland, Czechoslovakia, and Yugoslavia. This convention will be presented to a world conference in the beginning of 1931 for signing by the delegates thereto.

The significance of this for American machinery and tool manufacturers is that if the United States does not sign and ratify they will—for a time at least—be at a 5 per cent disadvantage as compared with other exporters whose governments have signed on the dotted line. It is worth mentioning that the only multilateral commercial element formulated by the League of Nations which the United States has ratified is that of Abolition of Import and Export Prohibitions and Restrictions.

Crating Demonstration To be Given This Month

The Forest Products Laboratory of the Department of Agriculture at Madison, Wis., is offering another course in economical and efficient boxing and crating practices from Jan. 12 to 17, 1931. A new phase of the instruction will be transportation hazards of handling and of car movement. The course will include tests to show advantages and limitations of different styles of nailed wooden boxes, wirebound boxes, and fiber boxes; tests to show the importance of adequate nailing; effect of varying number of pieces in sides, top, bottom, and ends; advantages of hardwood ends and cleats; effect of using green lumber; and advantages of metal strapping; and tests of crates to show the best types of construction for various loads. Laboratory engineers are prepared to examine during the course a limited number of containers sent in by firms enrolling their employes, and to offer suggestions for improvement.

Several recent reference-book sheets in *American Machinist* summarized some of the material to be presented, and further sheets will summarize new developments resulting from these studies.

Iron Institute Announces Department Objects

The immediate objectives of the newly formed Technical Department of the Gray Iron Institute are described in a recent bulletin released by the Institute. Oliver Smalley, Technical Director, includes in the Bureau's objects the following: elevation of the standards of gray cast iron; study and advice on specifications; collaboration with other technical societies and committees; a survey of the test bar position, and beginning of testing the bars submitted by members of the Institute; organization of a consulting and information department issuing from time to time research and instruction bulletins arranged for lectures, articles, advertisements, and propoganda; exchanging information with various technical and foundry institutions; broadening present uses for products, and advising members entering new lines of endeavor.

Unemployment Subject At A.A.L.L. Meeting

The Third National Conference on Unemployment was held in connection with the Twenty-Fourth Annual Meeting of the American Association for Labor Legislation at Cleveland, Ohio, from Dec. 29-31. The sessions were held jointly with the American Economic, American Political Science, and American Statistical Associations and the American Sociological Society. The morning program on the first day at the Hotel Statler was on "Federal Aid in Labor Legislation," with Newton D. Baker presiding. Papers then presented include, "Practical Problems in Co-operation by the States," "Hazards to Local Governments," and "The Indestructible Union of Indestructible States." The afternoon session was devoted to, "Accomplishments and Limitations of the Official Unemployment Committee," that on the following morning on, "Industrial Changes and Unemployment," that in the afternoon on, "How Can We Measure Unemployment?," and that in the evening on, "Immediate Problems in Unemployment Legislation." The Wednesday morning session topic was: "Group Conflict in Social Legislation." Officers were elected at the annual business dinner scheduled on the evening of the first day of the meeting.

BUSINESS ITEMS

The Globe Steel Tubes Co., Milwaukee, has organized a subsidiary known as the Globe Stainless Tube Co. to carry on engineering, design, and manufacture of "stainless steel" tubes and tubular installations for corrosion and heat-resisting purposes. Officers of the Globe Steel Tubes organization will serve in similar capacities in the subsidiary. Paul J. Kalman is chairman, F. J. O'Brien, president, J. W. Floto, vice-president, and G. O. Ross, secretary and treasurer. Sales will be handled through the same offices.

The Michigan Steel Tube Products Co., has organized a subsidiary to be known as the Miller Shelby Products Division, according to a recent announcement by Charles E. Miller, President and General Manager. The new company will have headquarters in Shelby, Ohio, where a plant will be located for the manufacture of aircraft, automobile, and tractor parts, motor car accessories, and special rolled shapes for architectural purposes.

The Lester Die & Machine Company, 2810 Superior Ave., Cleveland, Ohio, has been organized for the manufacture of dies, die casting machines, and die casting engineering, by N. Lester, formerly connected with the P & R Tool Co., Worcester, Mass., and more recently with the Precision Castings Co., Syracuse and Cleveland. Incorporators and directors are N. Lester, William Lester, and F. W. McIntyre.

The McKeesport Tin Plate Co., through its subsidiary the Metal Package Co., has acquired the Fischer Can Co., Hamilton, Ohio.

The Heggie-Simplex Boiler Co., Joliet, Ill., has been reorganized under the Delaware law and has acquired the Joliet Bridge & Iron plant for expansion of its manufacturing facilities. James G. Heggie is president; Charles A. Russell, secretary-treasurer; and William A. Nevin, general sales manager. These officers and George A. Barr, John F. Heggie, and Thomas M. Heggie, Joliet; Allan C. Dixon, vice-president of the Terminal National Bank, Chicago; and Arthur K. Baker, Cleveland, are directors.

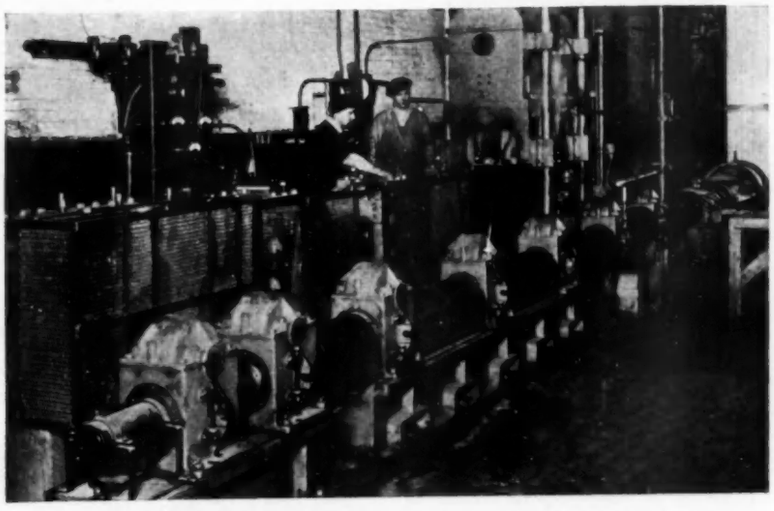
AEG and the Borsig Locomotive Co., Ltd., Germany's oldest locomotive factory, will combine their interests in a new company in which AEG will hold a majority of shares. The new combination, which has contracts for 15 per cent of the Federated Railways annual building program, holds third place among German locomotive plants, being exceeded by the Henschel and Krupp works. There are now but eight locomotive building firms left of twenty that existed in Germany three years ago. It is generally believed that further concentration will progress more rapidly.

The Aeolian Co., Meriden, Conn., has moved all equipment to Garwood, N. J., where operations will be centralized. Employees from Meriden will move with the company. Three months will be occupied in making the complete change.

The Morse Chain Co. and associated companies, Ithaca, N. Y., held their annual joint banquet in Ithaca on Dec. 9. Some 200 men associated with the various Morse enterprises, including department heads, foremen, and members of the office staff, attended.

The Balzer Machinery Co., Fourth & Pine Sts., Portland, Ore., has been appointed Oregon agent of the Byers Machine Co., Ravenna, Ohio. H. L. Niles will be in charge of sales of Byers equipment.

The Galion (Ohio) Iron Works will shortly open a new plant in eastern Canada, according to a recent announcement by Y. T. Leftwitch. This action was decided upon as the result of a new Canadian tariff regulation.



Electric welding machine for the manufacture of welded high-carbon structural steel tubing at Elyria (Ohio) plant, Steel & Tubes, Inc., a subsidiary of the Republic Steel Corporation

Plans have been announced by Benedict & Co., Inc., Los Angeles, for a new plant requiring the expenditure of approximately $250,000 for site, building, and added equipment. Controlling interest in Benedict & Co. recently was purchased by the Starr Piano Co., Richmond, Ind., which thus enters the electric refrigerator manufacturing field in southern California.

The Durant Motor Co., of California has sold its Oakland manufacturing plant to Norman Deveaux. Mr. Deveaux also purchased a factory at Grand Rapids, and will soon begin the manufacture of a new automobile to be known as the Deveaux Six. Associated with him will be Colonel Elbert J. Hall. The purchase of the Oakland factory and refinancing in connection with the purchase of the stock involves around $5,000,000 while the cost of the entire project is about $20,000,000.

Construction work was begun recently on the plant of the Simonds Saw & Steel Co., Inc., at East Fitchburg, Mass. A total of 1,200 tons of fabricated steel will be used in the structure, ready for occupancy June 1. The cornerstone of the building was laid on Dec. 20, Vice-President Thomas F. Howarth officiating. The day was also his 50th anniversary with the company. A general description of the plant was given in the Dec. 4 issue of *American Machinist*.

Consolidation of the Service Stamping Co., Bloomington, Ill., with the Jackson Auto Radiator Co., Chicago, a closed corporation, has been completed, and Otto A. Zinke of the Jackson company and Charles I. Will and Joseph Y. Grade, Service Stamping Co., were elected new directors. Officers have been elected as follows: Mr. Zinke, President; Mr. Will, Vice-President; and Mr. Grade, Secretary-Treasurer. Removal of machinery and supplies from Bloomington to Chicago has been completed.

The Los Angeles branch of Aluminum Industries, Inc., now is in full operation in the new location at 1148 South Olive St., to which it was removed from 1419 West Pico. Clyde C. Stonum, who for several years was employed at the San Francisco branch, has been transferred to Los Angeles as factory representative in Southern California.

The Fuller Lehigh Co., a subsidiary of the Babcock & Wilcox Co., will move its manufacturing operations and executive offices from Fullerton, Pa., to Barberton, Ohio. Executive offices will be located at 85 Liberty St., New York. A stock of repair parts will be maintained at Fullerton.

The Carnegie Steel Co. recently placed a contract with the Westinghouse Electric & Manufacturing Co., amounting to approximately $140,000, covering motors and control equipment to be used to drive a 28-in. roughing mill and a 22-in. finishing mill in the Duquesne Works of Carnegie.

The Motch & Merryweather Machinery Co., 2842 West Grand Blvd., Detroit, has been appointed Detroit dealer for the Diamond Machine Co., Providence, R. I.

The Simonds Manufacturing Co., Pittsburgh, Pa., has been appointed agent for the Ramsey silent chain.

The Keck Gonnerman Co., Mt. Vernon, Ind., has been incorporated with an initial capital stock of 2,010 shares with a declared par value of $100 each and is formed to operate foundries, machine and steel working shops. The first board of directors will include John Keck, William Gonnerman and Louis D. Keck.

The Toronto Industrial Commission reports the establishment in the Toronto area of the Packard Cable Co. of Canada, Ltd., to manufacture ignition sets, battery cables, and other accessories; and the Hammond Co. of Canada, Ltd., to manufacture synchronous electric clocks. The parent organization of the Packard Cable Co. of Canada is the Packard Electric Co., Warren, Ohio. The Hammond Co. of Canada also has connections with American organizations, being associated with the De Forest Crosley Radio Co., Ltd., and has secured the Canadian rights of the Hammond Clock Co. of Chicago.

The Niagara Machine & Tool Works, Buffalo, N. Y., has opened a branch office in Detroit, located at 3-217 General Motors Bldg. Russell J. Caplin, associated with the company for 16 years, will have charge of the Detroit office.

The Pacific Car & Foundry Co., Seattle, Wash., has received the contract for furnishing 15 crest gates for the east spillway of the Rock Island dam, under construction by the Stone & Webster Engineering Corporation for the Puget Sound Power & Light Co. The contract amounts to $40,000.

Production of Rowland valves, formerly manufactured in Seattle, Wash., by the Rowland Corporation, is new under way at the Oakland (Calif.) plant of California Hydro-Oil Burner, Inc., at 1714-20 Sixteenth St. L. D. Rowland, designer of the valve and formerly of the Rowland Corporation, is superintending the mechanical activities in connection with the production of the valves in the Oakland plant. O. E. Shumacher is president of California Hydro-Oil Burner.

The Martin Trailer Co., Westfield, Conn., has been taken over by the Highway Trailer Co., Edgerton, Wis. The Westfield plant will be operated as the eastern unit of the company. Charles H. Martin will become affiliated with Highway, which is capitalized for $1,000,000. The Martin company filed bankruptcy papers a short time ago.

The Washerless Valve Co., 136 Freelon St., San Francisco, has recently started the manufacture of a newly invented monel and brass valve which requires no washers. Distribution of the product, which is used on all types of valves, flushometers, etc., is being made to all parts of the United States from the San Francisco concern, of which Charles Camp is general manager.

The Illinois Iron & Bolt Co., Carpentersville, Ill., has purchased Bateman Bros. Inc., Poughkeepsie, N. Y., and will continue operation of that plant until in the spring. H. A. Rice, an executive, said that the plant will probably be moved to Carpentersville at that time and the line of parts produced in the eastern unit continued.

The Warner Gear Co., a division of the Borg-Warner Corporation, Muncie, Ind., is closing its Blaine St. plant from Dec. 27 to Jan. 3 for inventory. Plant Nos. 2 and 3, known as the Hackley St. and Hart plants, are being closed from Dec. 12 to Jan. 2 inclusive for inventory.

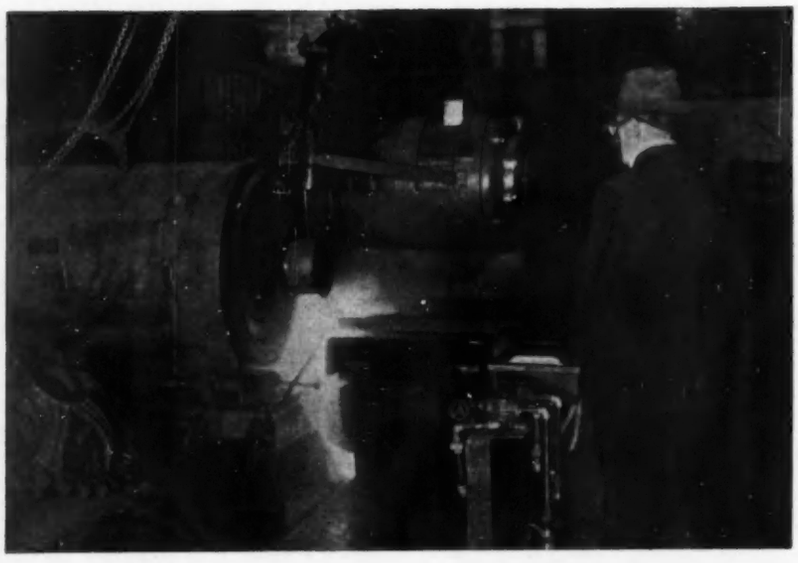
The Pangborn Corporation, Hagerstown, Md., will open district sales offices in Cincinnati and Milwaukee, effective Jan. 1. Thomas J. Dougherty has been appointed special sales engineer at the home office to cover the Hagerstown district. E. C. Gilmour will be district sales engineer for the Cincinnati office and H. O. Cost will occupy the same position for the Milwaukee office which will be in the Plankinton Bldg.

The Southern Manganese Steel Co., more recently known as the Southern Manganese Steel Division of the American Manganese Steel Co., Inc., Chicago Heights, Ill., is transferring all matters pertaining to sales from St. Louis, Mo., to Chicago Heights.

The Truscon Steel Co., with northern California headquarters in the Call Bldg., San Francisco, Calif., is completing a $50,000 one-story, steel-frame and concrete warehouse building at Carroll & Newhall Sts. The structure will be 60x160 ft. and will be equipped with a crane and runway on one side of the building.

The Walter S. Ryan Co., now located in their new building on Wider Woodward Ave., Beverly Hills, Detroit, Mich., has discontinued its office in the General Motors Bldg. All activities will be concentrated in the new office.

The Young Radiator Co., Racine, Wis., will be located in space B-114, Exhibition Building "B," at the Annual Convention and Road Show, St. Louis, Mo., Jan. 12-16.



Cutting off casting risers at the plant of the Harrison Steel Castings Co., Attica, Ind., with a Ryerson high-speed friction saw. The casting is rotated by a special attachment; torch and grinding operations are obviated

PERSONALS

Wesley M. Angle, Vice-President and Secretary of the Stromberg-Carlson Telephone & Manufacturing Co., has been elected president of the Rochester, N. Y., Chamber of Commerce for 1931.

Ashton B. Bean, Cleveland and Elyria, Ohio, will succeed Robert W. Woodruff as chairman of the board of directors of the White Motor Co., Cleveland. Mr. Bean and W. King White, President of the Cleveland Tractor Co., were elected directors. Mr. Bean has been president of the Bishop & Babcock Manufacturing Co., for a number of years.

J. M. Bonner, for a number of years manager of the Eljer-California Co., Los Angeles, has become general manager of the Whiting-Mead Co., Los Angeles.

Henry Bres-Chouanard, President of Aux Forges De Vulcain, 3 Rue St. Denis, Paris, France, for the past ten years, will continue in that office and direct the affairs of the organization, following the recent death of Emile Chouanard.

Earl J. Card, assistant manager of the Jamestown (N. Y.) Metal Equipment Co., Inc., has resigned to become general manager of the Olean (N. Y.) Metal Cabinet Works, Inc., to succeed the late Raymond J. Bullock.

William J. Davies has been appointed superintendent of the pipe fabricating shop of Murray W. Sales & Co., Detroit.

P. B. Eaton, Associate Professor of Lafayette College, Easton, Pa., has been promoted to full professorship in the Department of Mechanical Engineering.

James A. Fisher, New York, assistant district sales manager for the Wheeling (W. Va.) Steel Corporation, has been appointed Philadelphia district sales manager, to succeed L. J. Lowe, who will be transferred to the New York office.

J. M. Frank, President of the Ilg Electric Ventilating Co., 2850 North Crawford Ave., Chicago, has been elected president of the National Association of Fan Manufacturers.

John R. Geary, representative of the General Electric Co., in Japan for the past 27 years, and with the company for 41 years, has retired from active duty. He expects to remain in Japan for some time, and will continue to serve as a director of the Tokyo Electric Co., Ltd., and the Shibaura Engineering Works, Ltd.

Albert E. Grover, Cost Consultant, National Machine Tool Builders' Association, addressed the New York chapter, National Association of Cost Accountants, at its regular monthly meeting recently.

Albert W. Jacobs, President of the Star Headlight Co., Rochester, N. Y., has purchased the plant and business of the Artisan Sheet Metal Corporation, also of Rochester.

F. H. Kilgore, LaHarpe, Ill., was elected president, and James Peters, Mason City, Ill., vice-president of the Illinois Implement Dealers' Association at the annual convention recently. Other officers are Fred C. Scott, Peoria, secretary-treasurer; Harold Voorhees, Blandinsville; L. Thrift, Decatur; and W. E. Thompson, Mevlin, directors.

Carl H. Larson has been appointed Chicago district sales manager of the Motor Department, Ohio Electric Manufacturing Co., Cleveland, with offices at 333 No. Michigan Ave. He will also have jurisdiction over Grand Rapids, Mich.

Fred E. Lee, president for many years of the Beckwith Co., Dowagiac, Mich., has become chairman of the combined Beckwith Co., and Round Oak Furnace Co. W. J. Fickinger is the new president. Other officers include Frank Arndt, Vice-President in Charge of Production, Bruce E. Gollan, Sales Manager, Rene Walker, Secretary, and Harry L. Mosher, Treasurer.

Franklin D. Mooney, President of the Atlantic Gulf & West Indies Steamship Co., New York, has been elected a director of the E. W. Bliss Co., Brooklyn.

R. G. Olson, Milwaukee office manager for the American Blower Co., Detroit, has been transferred to the Cleveland branch.

A. E. Shepard has been made general manager of the C. F. Laganke Co., Inc., Card Bldg., 118 St. Clair Ave., N. E., Cleveland, Ohio. Mr. Shepard was previously factory manager for Sommer & Adams Co., and previous to that for 13 years master mechanic for the B. F. Goodrich Co., Akron. H. E. Henry, formerly of Tools & Gages, Inc., has been given charge of sales for Laganke.

Brinton Welser, Secretary of the Chain Belt Co., Milwaukee, Wis., has been elected a vice-president and director. Mr. Welser has been with the company since 1913.

D. A. Williams has been elected president of the Continental Steel Corporation to succeed Henry A. Roemer, who resigned recently to become president of the Sharon (Pa.) Steel Hoop Co. Mr. Williams, who has been vice-president in charge of operations for the Continental corporation, takes over his new duties as of Jan. 1.

OBITUARIES

Emile Chouanard, Administrateur, Aux Forges De Vulcain, 3 Rue St. Denis, Paris, France, died recently. Mr. Chouanard directed the company for 45 years.

Andrew Turnbull, 98, inventor of weighing scales and a number of other metal products, died in New Britain, Conn., on Dec. 22.

Wilbur M. Sperry, 58, President and General Manager of the Sperry Machine Shop Co., LeRoy, N. Y., and widely known as a machine engineer, died recently at his home in that city, following a heart attack.

Claud M. Dibble, 40, Vice-President in charge of production for Moore Bros., Joliet, Ill., died on Dec. 13. He had been associated with the company for seven years.

James T. Frank, for eight years metallurgical engineer in the steel foundry of Bethlehem Steel Co., Steelton, Pa., died on Dec. 9.

Benjamin F. Guiney, 72, until two years ago secretary to the president of the Kelsey Wheel & Manufacturing Company, Detroit, died there on Dec. 5.

Henry A. House, 90, famous inventor, who in 1866 built the first American steam automobile, died at his home in Bridgeport, Conn., on Dec. 18. He had taken out more than 300 patents.

Richard P. Joy, 60, formerly vice-president of the Detroit Copper & Brass Rolling Mills and a director of the Packard Motor Car Co., Detroit, died Dec. 15 in that city following an operation for appendicitis. He withdrew from active business several years ago.

Michael A. Norton, President of the Albany (N. Y.) Brass Foundry, Inc., died recently there. He was formerly president of the Sweet & Doyle Foundry Co., Green Island, N. Y.

Charles Franklin Olin, 60, Advertising Manager of the New Departure Manufacturing Co., Bristol, Conn., for 26 years, died on Dec. 25 after an illness of about nine months. Mr. Olin was one of the best known, and most highly esteemed advertising men in New England.

Edmund Roebling, 76, died on Dec. 21 at his home in New York City. Mr. Roebling retained a financial interest in John A. Roebling's Sons Co., Trenton, N. J., even though he had retired more than 20 years ago.

FORTHCOMING MEETINGS

SOCIETY OF AUTOMOTIVE ENGINEERS—Annual meeting, Detroit, Jan. 19-23, 1931. John A. C. Warner, 29 West 39th St., New York, secretary.

STEEL FOUNDERS' SOCIETY OF AMERICA—Annual Meeting and Election, Jan. 29, Hotel Hollenden, Cleveland, Ohio. G. P. Rogers, Managing Director, 932 Graybar Bldg., New York City.

FIFTH MIDWESTERN POWER & ENGINEERING CONFERENCE AND EXPOSITION—Chicago, Feb. 10-14, 1931. G. E. Pfisterer, 53 West Jackson Blvd., Chicago, secretary.

WESTERN METAL CONGRESS AND EXPOSITION—Second National, Civic Auditorium, San Francisco, Calif., Feb. 16-20, 1931. Under auspices of A.S.S.T. W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland, Ohio.

THREE-M-CONGRESS — Management, Maintenance, and Materials Handling Congress and Second National Industrial Equipment Exposition, Cleveland, Ohio, April 13-18, 1931. In the Arena and Exhibit Hall, Cleveland Public Auditorium. Information from the A.S.M.E., 29 West 39th St., New York City.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Calvin W. Rice, executive secretary, Engineering Societies Bldg., 29 West 39th St., New York, N. Y. The following meetings are scheduled:

Semi-Annual meeting, Birmingham, Ala., Apr. 20-23, 1931.

National Materials Handling Meeting and Management congress, Cleveland, April 12-16, 1931.

National Aeronautic Meeting, Baltimore, Md., May, 1931.

AMERICAN FOUNDRYMEN'S ASSOCIATION—Annual convention and exhibition, Stevens Hotel, Chicago, May 4-8, 1931, C. E. Hoyt, 222 West Adams St., Chicago, secretary.

AMERICAN GEAR MANUFACTURERS' ASSOCIATION—Annual Spring Meeting, Hotel Statler, Buffalo, May 7-9, 1931. T. W. Owen, 3608 Euclid Ave., Cleveland, secretary.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine tool business

NEW YORK

Christmas week as usual had little to offer in the way of either orders or inquiries. The situation is largely as it was last week. Orders reported were of the single-tool variety, and few inquiries appeared to show immediate prospects. Dealers are sincerely optimistic for 1931. Many of them have orders in hand which will be released "as soon as business gets better." General effort of the industry to improve its position is indicated in the next *American Machinist* Semi-Annuel Review, which will contain 20% more items than any previous review, exceeding even the unusual total of the issue of the final half of 1929, which included new tools on exhibit at the convention of the National Machine Tool Builders' Association.

The Inland Steel Co. has purchased $4,000,000 worth of machinery and equipment from the Mesta Machine Co. The Canadian Pacific has ordered 250 steel refrigerator cars, and the Government is inquiring for equipment for the Panama Canal, principally electrical equipment for towing locomotives.

CHICAGO

Present conditions are practically at the same stage as for the last several months. Inquiries have fallen off to some extent, the taking of inventories being given as one reason for the decrease. Among the few railroad inquiries received is one from the Santa Fe for a pipe threading machine and a pipe bending machine. So far as manufacturers' representatives and distributors are willing to express themselves, a pick-up is not looked for until the year is well advanced, and there are those who look for little, if any, improvement for several months to come. These are in the minority, however, the general feeling being that by next spring there will be a distinct upward trend.

NEW ENGLAND

New England enters the new year blessed with a good volume of prospective orders.

The week's outstanding developments include a $900,000 order placed by the Boston & Albany for 10 passenger locomotives. The Osgood Bradley Car Co., Worcester, has an order from the Brooklyn & Queens Corporation, New York, for 50 latest type trolley cars, representing $750,000 and four months operations. Prentice Manufacturing Co., Berlin, Conn., is on overtime schedules and is buying new machinery.

DETROIT

The machinery and machine tool trade here is in a state of temporary suspension during the holiday inventory season. No orders are being received and it might be said that none are being sought for the reason that most of the automobile and accessory plants are closed down. Some of them will open during the first week of the new year and some will wait until the second week or perhaps even later. For the most part the dealers here are optimistic about next year's prospects. All of the automobile plants are showing signs of improved conditions.

Machinery and machine tool dealers are making plans for a good year. They know that inventories have been cut to almost nothing and they realize that a prompt revival is certain as soon as general business begins to regain confidence in itself. As a matter of fact the trade in this area has come through a very serious business depression without casualties and on the whole with an excellent showing. Few have lost money on the year's business, prices have not been cut, personnels have been kept intact, and the morale of the trade is at a high point.

■

A HAPPY NEW YEAR is predicted by dealers and manufacturers throughout the country, estimates of the time of its beginning running all the way from Jan. 15 to well into the second quarter. Markets are now comparatively quiet, as is usual through the holiday season, though inquiries are holding up unexpectedly well. New York reports one exception to this statement in that inquiries have declined, though some purchases are reported, and the semi-annual review number of *American Machinist* will contain 20% more new tools than normally, an indication of increasing efforts at redesign in preparation for bettered conditions.

CHICAGO inquiries have also fallen, and current business is unchanged. New England has good prospects, and lists several rolling stock orders. Detroit business has been suspended for the holidays. Cincinnati sales and inquiries both hold well, considering the season, though production has lulled.

CLEVELAND predicates better business on automobile production, placing the real upturn at the middle of the year. Buffalo inquiries are high, though sales are low and no change is expected immediately. Indianapolis reports conflicting trends, but the situation is generally "looking up." Milwaukee is quite optimistic, expecting orders immediately after the first of the year and reporting a better December than was anticipated.

CINCINNATI

After encountering an adverse business tide through 1930, machine tool manufacturers are glad to be beginning a new cycle. A gratifying feature rests in the fact that there has been no great loss from shrinkage in values of tools on hand, as there was in the readjustment period of 1920. Prices of tools remained stable, and such loss as there was came mainly from reduced volume of sales. Members of the trade are optimistic.

Although the past week was in the holiday season there was not much ground lost either in the volume of sales or in the number of inquiries received. There was some lull in production, however, due to a portion of the plants closing over the week .end. Selling agents are holding their own.

CLEVELAND

While admitting that machine tool business for 1930 has been the poorest year in a decade, the industry is of the opinion that 1931 promises to be bigger and better.

Slight gains in sales are expected in the first quarter with a steady upward trend in the second quarter and a general resumption of buying in the last half of the year. Increased automobile production, according to the consensus of opinion, is a vital factor. Car output for the last six months has been at a low ebb, while gasoline consumption indicates that mileage has not fallen off in 1930.

BUFFALO

The tone of business is somewhat more optimistic than for several weeks past, but this is not due to immediate business. Instead it is due more to prospects after the New Year opens. There seems to be a comparatively large number of inquiries out in every field with the possible exception of contractors' equipment. The percentage of inquiries is far higher than was the case last year at this time.

Actual sales for December are at a low ebb. One bright spot is seen in a sale made by a house specializing in pumping equipment during the last week involving more than $4,000.

It is anticipated that there will be a fairly good business from Jan. 15 on, although some dealers do not believe that there will be any decided buying movement until March or April.

INDIANAPOLIS

Sales during the last two weeks have been none too heavy. The trade does not expect much business now until after the first of the year. Most factories are taking inventory and there will be the holiday period that will cut production.

Inquiries are being received from different furniture factories throughout the state for special woodworking equipment. The volume is not so large, but the factories are resuming production, some of them on a capacity basis.

The trade is wondering what will happen to the road equipment business this spring. Iron and steel demand continues quiet. Railroads also are disappointing in their purchases. Some shops have laid off men until after the first of the year. A fair demand continues for special equipment for the electric and gas utilities and also for the radio factories.

MILWAUKEE

A new note of optimism developed in the Milwaukee machinery and machine tool market during December, although reports earlier in the month were less encouraging. While manufacturing firms did not report general increases in orders, the majority reported a marked upward trend in the number of inquiries received. However, reports generally indicate that December was far better than expected and orders went ahead of November. Estimates for the entire year 1930 average about 50 per cent of the 1929 volume.

Several large users of tools are reported to be releasing appropriations and will place their orders shortly. Quite a few projects are said to be ready to break right after the first of the year, instead of "some time next year" which was taken to indicate late winter or early spring. Resumption of many industrial plants is certain to require replacements and possibly some new additions. Electrical and steel manufacturing concerns are named being ready to place, with automotive fair prospects for renewing in the new year. Railroads and farm implement manufacturers are showing no interest as yet.

BUSINESS • BAROMETER

If public works funds are put into use immediately, business activity should revive soon

THEODORE H. PRICE
Editor, Commerce and Finance, New York

IT IS the holiday season, and many reviews of the world's business are in course of preparation for publication during the coming week. In so far as figures and facts go, most of these reports will be historically correct, but their authors do not pretend to be prophets or to be gifted with the foresight attributed to some of them. For this reason, the writer will not attempt to forecast the future as the advent of the new year is awaited. If this article were written under compulsion of instructions to make it prophetic, it would call attention to two of last week's happenings as among the most important occurrences of the year that is now approaching its close.

One is the action of Congress in reporting three measures calling for total appropriations of $311,000,000. This total includes $150,000,000 for the Federal Farm Board to be used in further stabilization of prices. Then there is an appropriation of $116,000,000 to be used in employing the unemployed by the completion of governmental projects recently authorized. And finally there is the appropriation of $45,000,000 for drought relief.

Next in importance to these governmental appropriations is the announcement that the community chests conducting fall campaigns in various parts of the country have raised a total of $42,576,000 for the relief of human distress during 1931. This is an increase of $3,669,000 or nearly 10 per cent over the total raised during the autumn campaigns of last year. If the money so raised represented the contributions of a few rich men it might not be significant, but this is not the case. The $43,000,000 pledged to charity has been contributed by thousands of persons, and it would not have been possible to obtain if the depression were as acute as many profess to believe.

There is one other item that is entitled to special consideration. It is an announcement that American tourists spent over $5,000,000,000 at home and abroad during the year 1930. Other details of the week's financial news are unimportant. The Federal Reserve Bank of New York has reduced its re-discount rate to 2 per cent. The other banks are expected to follow and easy money until well into the year seems to be assured. The failure of a small though important bank in New York City has temporarily revived the apprehension of some, but there are many bankers who insist that the recent epidemic of bank failures all over the country has been permitted because misery loves company, and severe censure for the mismanagement of the failed banks is less likely when so many institutions are in trouble.

A reversion to normal optimism is now overdue, and a reversal of sentiment seems to be making itself felt in many directions. The reasons for such a change in sentiment are not always apparent; at least until after it has taken place. Hence it is in order to examine the facts closely with a view of ascertaining whether such a change in sentiment is warranted.

In a recent interview a prominent member of the American Bar expressed his regret that there were so few members of his profession who appreciated "the persuasive value of under-statement." This is why American business men have learned to be so careful in expressing their views of the future. It is the more surprising as they are very optimistic in their confidential interviews and most of them are preparing for an active business next summer.

Among the reasons given for this optimism there are two or three which seem entitled to consideration. One is the news from London that the Government will soon be able to employ 500,000 unemployed workers on public improvements that have been authorized, and for which Parliament will be asked to provide the money. The other is the $42,576,000 that has been raised for the relief of the unemployed in the United States. The third is the $311,000,000 recently appropriated by Congress for farm relief, governmental construction, and drought relief.

Finally there is silver. In London it recently sold at 14½ pence per ounce. This is the lowest price on record. From it there has been a slight recovery, but no one expects any important advance, and it is becoming more and more evident that the demonetization of silver is working the economic ruin of China, Japan, and Orient, where the population clings to the white metal despite the efforts that Great Britain is making to induce popular acceptance of gold as a standard of exchange. There are several English economists who insist that a further decline in silver will cause great hardship, and that it may lead to the commercial disruption of the British Empire, unless it is stabilized.

It is expected that under any circumstances silver will continue to circulate as money. Hence the problem that confronts the British financiers is a method of effecting the necessary stabilization. If it can be effected, and the money appropriated for public works in this and other countries can be promptly put into circulation, we ought to see an immediate change in public sentiment, and a revival of confidence and business activity throughout the world.

THE BUSINESS WEEK

December 31, 1930

THE statistical Santa Claus has so far pulled nothing either very surprising or very disappointing out of the Christmas pack. . . . Holiday business seems to be in fair volume, but the trade indicators are confused by abnormal shifts of currency and bank funds accompanying withdrawals of deposits and closing of banks due to popular hysteria in some sections. . . . Building contracts are holding up surprisingly well for the season and this may be significant if it continues. . . . Merchandise carloadings also are declining more slowly than usual at this period. . . . Industrial activity is slackening rapidly, as it usually does in the last two weeks of the year, what with holiday and inventory shut-downs; but a fair amount of forward buying of steel at firm prices strengthens the promise of a first of the year upturn. . . . Our index remains practically unchanged for the week ended Dec. 20, at about 76% of normal. . . . The return of strength to the bond market is the most encouraging event of the past week. . . . Rumors that the Federal Reserve is planning to give the world a Christmas present by larger security purchases are ringing down the wind like distant sleigh-bells; but it's harder to believe in Santa Claus this year. . . . If the old boy makes good in this line after all the letters we've written him about it, we'll confidently be able to wish you a Happy New Year.

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THE WEEKLY PRICE GUIDE . . . .

Rise and Fall of the Market

COMPARING current prices of the principal shop materials and supplies out of dealers' warehouse, with those of a year ago, it is seen that quotations either declined or remained unchanged, there having been no advances of importance. Percentage decreases in prices of the chief materials are as follows: Shafting, 2.8; bars, 3.1; bolts, 22.2; brass, 24; solder, 28.8. No changes occurred in cotton waste, abrasives, cutting oil, machine oil, and leather belting. Steel shapes at Pittsburgh mill are $1.60 per 100 lb., against $1.90 in January, 1930.

(All prices as of Dec. 26, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI:	
Ala. Foundry (Silicon, 1.75@2.25)	$14.19@$14.69
Tenn. Foundry (Silicon, 1.75@2.25)	14.19@ 14.69
NEW YORK:	
Buffalo No. 2 Fdry. (Silicon, 1.75@2.25)	20.41@ 20.91
BIRMINGHAM:	
No. 2 Foundry (Silicon 1.75@2.25)	14.00
PHILADELPHIA:	
Eastern Pa., No. 2x (Silicon, 2.25@2.75)	18.26@ 19.26
Virginia No. 2 (Silicon, 1.75@2.25)	22.29
Basic	17.75@ 18.25
CHICAGO:	
No. 2 Foundry, Northern (Silicon, 1.75@2.25)	17.50
No. 2 Foundry, Southern	17.51
PITTSBURGH: (including freight charge, $1.76, from Valley)	
No. 2 Foundry	18.76
Basic	18.76
Bessemer	19.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.00
Cleveland	4.75
Cincinnati	4.45
New York	4.75@5.00
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	1.90	3.35†	3.00	3.40†
No. 12	1.95	3.45†	3.10	3.45†
No. 14	2.05	3.55†	3.20	3.50†
No. 16	2.15	3.65†	3.30	3.60†
Black				
Nos. 18 to 20	2.15@2.25	3.60†	3.40	3.70
No. 22	2.30@2.40	3.75†	3.55	3.85
No. 24	2.35@2.45	3.80†	3.60	3.90
No. 26	2.45@2.55	3.90†	3.70	4.00
No. 28	2.60@2.70	4.05†	3.85	4.15
Galvanized				
No. 10	2.20@2.30	3.65†	3.50	3.55
Nos. 12 to 14	2.30@2.40	3.75†	3.60	3.65
No. 16	2.40@2.50	3.85†	3.70	3.75
No. 18	2.55@2.65	4.00†	3.85	3.90
No. 20	2.70@2.80	4.15†	4.00	4.05
No. 22	2.75@2.85	4.20†	4.05	4.10
No. 24	2.90@3.00	4.35†	4.20	4.25
No. 26	3.15@3.25	4.60†	4.35	4.50
No. 28	3.40@3.50	4.85†	4.70	4.75

*Light Plates. †400 to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. butt..	56.14%	43.6%	53.3%	42.3%	57.3%	44.8%
3½ to 6 in. lap..	52.72%	40.18%	50.8%	37.8%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—Decimal	B.w.g. and Fractions	Outside Diameter in Inches—½	⅝	¾	⅞	1	1⅛	1¼
		Price per Foot						
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049″	18	.17	.18	.19	.20	.21	.23	.25
.065″	16	.19	.20	.21	.22	.23	.25	.27
.083″	14	.20	.22	.23	.24	.25	.27	.29
.095′	13	.21	.23	.25	.26	.27	.29	.31
.109′	12	.22	.24	.26	.27	.28	.30	.32
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33
.134″	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	7.00	6.00	6.15
Hoop steel	3.75†	4.00	3.75†
Cold rolled strip steel	4.95	6.00	6.10
Floor plates	4.85†	5.30	5.00†
Cold fin., round or hexagon‡	3.40	3.65	3.35
Cold fin,, flat or square‡	3.90	4.15	3.85
Structural shapes	3.10†	3.00	3.00†
Soft steel bars	3.10†	3.00	3.00†
Soft steel bar shapes	3.10†	3.00	3.00†
Soft steel bands	3.40†	3.65	3.20†
Tank plates	3.10†	3.00	3.00†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, 3/16-in. thick by ¾-in. wide. †400 to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse—3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ½, 7.35c. per lb.

METALS

Warehouse Delivery Prices in Cents Per Lb. for Small Lots:

Copper, electrolytic, New York			11.25@11.75
Tin, Straits, pigs, New York			27.00@28.00
Lead, pigs, E. St. Louis	4.95	New York	6.00@ 7.00
Zinc, slabs, E. St. Louis	4.00	New York	5.75@ 6.75

	New York	Cleveland	Chicago
Antimony, slabs	9.50@10.50	10.50	10.75
Copper sheets*	20.75	20.75	20.75
Copper wire*	13.25	13.37½	13.37½
Copper, drawn, round*	19.25	19.25	19.25
Copper tubing*	23.12½	23.12½	23.12½
Brass sheets, high*	17.87½	17.87½	17.87½
Brass tubing, high*	22.75	22.75	22.75
Brass rods, high*	16.12½	16.12½	16.12½
Brass wire, high*	18.37½	18.37½	18.37½

*Mill, base.

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%†	24.00@25.00	24.30	23.30
Zinc sheets (casks)	9.75@10.25	11.25	10.36
Solder (½ and ½)	21.50	21.50	18@20
Babbitt metal, delivered in case lots, New York, cents per lb.:			
Genuine, highest grade			45.00
Commercial genuine, intermediate grade			34.00
Anti-friction metal, general service			30.00
No. 4 babbitt, f.o.b.			10.00

†F.O.B.

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va.:

	Nickel	Monel Metal
Sheets, full finished	52.00	42.00
Sheets, cold rolled	60.00	50.00
Strip, cold rolled	55.00	45.00
Rods, hot rolled	45.00	35.00
Rods, cold drawn	50.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled	50.00	40.00
Plates	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper	7.75	8.50	7.25@7.75
Copper, heavy, and wire	7.50	8.00	6.75@7.25
Copper, light, and bottoms	6.75	7.25	6.00@6.50
Heavy lead	3.75	4.00	3.00@3.50
Lead battery plates	2.00	....	2.00@2.50
Brass, heavy, yellow	4.25	6.50	4.00@4.50
Brass, heavy, red	7.00	9.50	6.25@6.75
Brass, light	3.75	5.50	3.50@4.00
No. 1 rod-brass turnings	4.75	5.50	4.25@4.75
Zinc	2.00	1.50	1.25@1.50

TIN PLATES—Charcoal—Bright—Per box:

"AAA" Grade:	New York	Cleveland	Chicago
IC, 14x20	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.13	$0.16	$0.15
Cotton waste, colored, per lb.	.09½	.12	.10
Wiping cloths, washed, white, per lb.	.14	38.00 per M	.14½
Sal soda, per lb.	.01¾	.02	.02
Roll sulphur, per lb.	.028	.03	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.	.096	.104	.098
Cutting oil, about 25% lard, in 5 gal. cans, per gal.	.65	.60	.60
Machine oil, medium-bodied (55 gal. steel bbl.) per gal.	.33	.36	.24
Belting—Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin.ft., per inch of width, for single ply:			
Medium grade	30–10%	30–10%	35%
Med. grade, heavy wgt.	30%	30 –5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.:			
First grade	60%	50–10%	50%
Second grade	60–5%	60– 5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.031	$0.031	$0.0325
Cold fin. shafting	per lb.	.034	.034	.035
Brass rods	per lb.	.1612½	.1687½	.2125
Solder (½ and ½)	per lb.	.215	.225	.3025
Cotton waste, white	per lb.	.13	.13	.13
Disks, aluminum oxide mineral, cloth, No. 1 6-in. dia.	per 100	4.59	4.59	4.59
Lard cutting oil	per gal.	.65	.65	.65
Machine oil	per gal.	.33	.33	.33
Belting, leather, medium	off list	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs	off list	65%*	65%*	50–10%*

*List prices as of April 1, 1927

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*	$6.03	$6.03	$6.03
Emery cloth*	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†	2.61	2.61	2.61
Cloth†	4.59	4.59	4.59
Fire clay, per 100 lb. bag	.90	.75	.75
Coke, prompt furnace, per net ton	Connellsville,		2.40@2.50
Coke, prompt foundry, per net ton	Connellsville,		3.50@4.85
White lead, dry	100 lb. kegs	New York,	13.75
White lead, in oil	100 lb. kegs	New York,	13.75
Red lead, dry	100 lb. kegs	New York,	13.75
Red lead, in oil	100 lb. kegs	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less	65%
Larger, up to 1 x 30-in., full kegs, list less	65%
Less than full kegs or case lots, add to list	10%
Fitting-up bolts: list less	45%
Lag screws:	
Up to ½-in. x 6-in., list less	65%
Larger, list less	65%
Less than full keg or case lots, add to list	10%
Rivets:	
Structural, round head, full kegs, net	$4.50
Structural, round head, broken kegs, net	6.00
Tank, 7/16-in. dia. and smaller, list less	65%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less	65%
Larger, up to 3-in., list less	65%
Less than keg or case lots, add to list	10%
Washers:	
Wrought, full kegs, per 100 lb., list less	$4.00
Wrought, broken kegs, per 100 lb., list less	2.00
Turnbuckles:	
With stub ends, list less	20–10%
Without stub ends, list less	55%
Chain:	
Proof coil, base, per 100 lb., net	$8.50
Cast iron welding flux, per lb., net	.35
Bronzing flux, per lb., net	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Mass., South Lee—Dwight D. Hopkins Lumber Co.—woodworking machinery to replace fire loss.

Mich., Detroit—Dept. of Street Railways, St. Jean and Shoemaker Aves.—one turning and grinding machine and accessory equipment, also portable cylinder reborer and grinder.

Ont., Kitchener — Art Furniture Co., West Lancaster St., J. A. Woolner, Pres. and Gen. Mgr.—complete woodworking equipment to replace fire loss. $150,000.

Opportunities for Future Business

Ala., Montgomery — Constructing Quartermasters Dept., Maxwell Field, will receive bids until Jan. 16 for paint, oil and dope warehouse, also maintenance shop, warehouse and garage, at U. S. Flying field. Estimated cost $100,000.

Arizona—State Fish & Game Dept., R. L. Bayless, Secy., Phoenix, will soon award contract for rearing ponds, building and garage at Pinetop; building and garage at Mormon Lake and building and garage at Indian Gardens. Lesher & Mahoney, Arizona National Bank Bldg., Archts.

Calif., Long Beach—Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich., is having plans prepared for main factory building here. Estimated cost to exceed $350,000. A. Kahn, Inc., 1004 Marquette Bldg., Detroit, Mich., Archts.

Calif., Los Angeles—Los Angeles School District, is having plans prepared for a 2 and 3 story school including shop, etc. Estimated cost $400,000. Austin & Ashley, Chamber of Commerce Bldg., Archts.

Calif., Oakland — C. N. Burrell, American Bank Bldg., Archt., is receiving bids for the construction of a 1 story factory on 102nd Ave. for Hammer-Bray Co., 26th Ave. and East 12th St. Estimated cost $200,000. Noted Nov. 27.

Calif., Santa Barbara—Santa Barbara City School Dist., is receiving bids for the construction of a 2 story school including administration building, shop building, etc. Estimated cost $350,000. W. H. Weeks, 111 Sutter St., San Francisco, Archt.

Calif., Stockton—State of California, received lowest bid for the construction of a 2 story hospital and 2 story industrial building from Sorensen & Haggmark, 2652 Harrison St., San Francisco. $70,000.

Conn., Bridgeport—Dugan Bros., is having plans prepared for a 1 story, 60 x 200 ft. service building on Boston Ave. Estimated cost $60,000. H. Holder, 242 Franklin Ave., Brooklyn, N. Y., Archt. Fletcher Thompson Inc., 1336 Fairfield Ave., Bridgeport, Engrs.

Conn., Bridgeport—Lindstrom Tool & Toy Co., Silliman St., awarded contract for a 2 story, 50 x 150 ft. factory. Estimated cost $50,000.

Conn., Waterbury—E. Perrault, 510 South Main St., is receiving bids for a 1 and 2 story, 43 x 50 and 15 x 50 ft. shop and office.

D. C., Washington—Palais Royal Inc., 11th and G Sts. N. W., is having plans prepared for a 4 story, 150 x 190 ft. storage and distribution plant, including repair shop, furniture finishing shop, etc. Estimated cost $150,000. F. G. Pyle, Evans Bldg., Archt. Abbott, Merkt & Co., 175 5th Ave., New York, Engrs.

Fla., Jacksonville—Chevrolet Motor Co., 3044 West Grand Blvd., Detroit, Mich., had plans prepared for the construction of a 1 story assembling plant here. Estimated cost $75,000.

Ga., Atlanta — H. A. Varner, Rivers Rd., awarded contract for the construction of a 2 story, 50 x 200 ft. pencil factory on Houston St. Estimated cost $50,000.

Ill., Crystal Lake—Public Service Co. of Northern Illinois., 72 West Adams St., Chicago, awarded contract for the construction of a service headquarters building here. Estimated cost $175,000.

Ind., Mishawaka—Wash-A-Bill Cap Co., awarded contract for the construction of a factory at 6th and Hendricks Sts. Estimated cost $25,000.

Mass., Boston—Owner, c/o S. Elliot, Trustee, 131 State St., is having plans prepared for several cage garage buildings in various sections. G. E. Robinson, 80 Federal St., Archt.

Mass., South Lee—Dwight D. Hopkins Lumber Co., is having plans prepared for a woodworking plant. Estimated cost $75,000, including equipment. Private plans.

Mass., Springfield — Granville Bros. Aircraft Corp., plans the construction of a manufacturing plant.

Mass., Springfield—Springfield Wire & Tinsel Co., 68 Taylor St., awarded contract for a 1 story, 85 x 120 ft. plant. Estimated cost $45,000.

Mass., Watertown—New England Telephone & Telegraph Co., 50 Oliver St., Boston, will receive bids until Jan. 13 for a 1 and 6 story, 85 x 265 and 120 x 140 ft. warehouse and garage at Mt. Auburn and Grove Sts. Estimated cost to exceed $40,000. Monks & Johnson, 99 Chauncy St., Boston, Engrs. Noted Dec. 25.

Mich., Dearborn — Ford Motor Co., 3674 Schaefer Rd., is receiving bids for caisson work for foundation, for mixer and furnace, open hearth steel plant. Giffels & Vallet, 604 Marquette Bldg., Detroit, Engrs.

Mich., Holt—Holt Mica Spark Plug Co., recently organized, plans a 1 story plant. Estimated cost $40,000.

Mich., Ludington—Pere Marquette Railway Co., Fort Street Union Depot, Detroit, awarded contract for a 1 story repair shop here. Estimated cost $40,000.

Mo., Kansas City—Acme Furnace & Sheet Metal Co., 407 Southwest Blvd., awarded contract for a 1 story, 50 x 100 ft. addition to factory. Estimated cost $25,000.

Mo., Osage—Missouri State Prison, c/o F. B. Jones, Dir. of Penal Institutions, awarded contract for re-inforcing steel and steel windows, for intermediate reformatory, including dormitory building, administration building, shops, etc. Work by convict labor. Noted Oct. 23.

Mo., St. Louis — Goodrich Silvertown Inc., c/o R. E. Kenner, Zone Mgr., awarded contract for the construction of a 2 story, 107 x 125 ft. super service station at Olive and 23rd Sts. Estimated cost $45,000.

Mo., Springfield—Springfield Tablet Mfg. Co., 300 North Jefferson St., awarded contract for a 2 story, 60 x 76 ft. addition to factory at Mill and Jefferson Sts.

Mo., Springfield—Standard Oil Co., 500 North Grand Ave., awarded contract for a 2 story, 64 x 122 ft. warehouse, 55 x 84 ft. garage and 56 x 110 ft. tank yard at National Blvd. and Frisco tracks. Estimated cost $60,000.

N. J., Montclair—White Motor Sales Inc., 640 Bloomfield Ave., rejected bids for 2 story, 100 x 165 ft. garage, etc., at Grove and Glen Ridge Sts. $150,000. A. E. Ramhurst, 516 Bloomfield Ave., Archt. Project abandoned. Noted Oct. 30.

N. J., Newark—P. A. Singer & Bros., 113 New Jersey R.R. Ave., postponed construction of a 1 story, 40 x 110 ft. factory at 170 Delaney St. $40,000. M. A. Wolf, 845 Broad St., Archt. May go ahead with a smaller project at a later date.

N. Y., Brooklyn—Kings County Hospital, 451 Clarkson St., plans the construction of a garage, shop and mechanical building. Estimated cost $450,000. LeRoy P. Ward, Inc., 205 East 42nd St., Archts.

N. Y., Brooklyn—A. Smith, Stillwell Ave. and Quentin Rd., is having sketches made for a 2 story, 80 x 100 ft. service garage. Estimated cost $50,000. Burke & Olsen, 32 Court St., Archts.

N. Y., Dongan Hills — Sea View Hospital, Manor Rd., Dongan Hills, S. I., plans reconstruction of a garage and repair shop. Estimated cost $90,000. Sibley & Fetherstone, 205 East 42nd St., Archts.

N. Y., Jamaica—Hickory Homes Corp., c/o H. Dean, 104-23 220 St., Queens Village, Archt. is having sketches made for a 1 story, 100 x 100 ft. service garage at 98th Ave. and 218th St. Estimated cost $40,000.

N. Y., Long Island City — D. H. Yeoman, 89-15 187th St., Hollis, plans the construction of a service garage at 54th St. and 21st Ave. here. Estimated cost $50,000. J. A. Boyle, 367 Fulton St., Brooklyn, Archt. Maturity in February. Noted Dec. 18.

N. Y., New York—Allerad Realty Corp., L. Silver, Pres., 391 East 149th St., is having sketches made for the construction of an 80 x 100 ft. service garage at Tremont and Leland Aves. Estimated cost $40,000. Siegel & Levy, 1775 Broadway, Archts.

N. Y., New York — City Hospital, Welfare Island, plans the construction of a garage. Estimated cost $150,000. B. R. Swartburg, 2 West 46th St., Archt.

N. Y., New York—D. Salitino, 1839 Sedgwick Ave., is having sketches made for a 1 story, 75 x 165 ft. service garage at Sedgwick Ave. and 169th St. Estimated cost $40,000. W. Hohauser, 17 West 44th St., Archt.

N. Y., New York—Sidlo Realty Co., 391 East 149th St., is having sketches made for a 2 story, 50 x 140 ft. service garage at Webster Ave. and Mosholu Parkway. Estimated cost $40,000. Siegel & Levy, 1775 Broadway, Archts.

O., Galion—Gledhill Road Machinery Co., plans the construction of factory. Estimated cost $50,000 to $100,000.

Okla., Oklahoma City — City defeated bond election for $175,000 for the construction of a garage. G. F. Brown, City Hall, Engr. Noted Dec. 4.

Pa., Pittsburgh—H. C. Clepper, 103 Vandergrift Bldg., Archt., will receive bids until Jan. 5 for the construction of a 1 story service station at Penn and Main Sts. for Sterling Oil Co., R. S. Newton, Chg. Const., Emlenton. Estimated cost $40,000.

R. I., Providence—Autocar Sales & Service Co., 302 Pearl St., awarded contract for the construction of a sales and service station on Branch Ave. Estimated cost $75,000. Noted Dec. 18.

Tex., Beaumont—City c/o P. Millard, Mgr plans the construction of an airport including hangars, repair shop, etc. Estimated cost $75,000. Irby & Woodside, 1020 Beaumont St., Archts. and Engrs.

Tex., Dallas—National Air Transport Inc., 420 Lexington Ave., New York, is having plans prepared for a new hangar including repair facilities, etc., near here.

Tex., Liberty—Texas & Louisiana Tool Co., acquired a site and plans the construction of a tool factory.

Tex., Schertz — U. S. Government, A. W. Parkers, Constructing Quartermaster, awarded contract for the construction of a 1 story, 100 x 500 ft. garage for general repairs and storage purposes at Randolph Field, 14 mi. north of San Antonio. $56,715. Noted Dec. 11.

Va., Richmond—Franklin Motor & Service Garage, 9th and Franklin Sts., plans a 100 x 145 ft. automobile service and repair building. Estimated cost $300,000. M. E. Wright, American National Bank Bldg., Archt.

Ont., Tecumseh — Empire Farm Machinery Co. Ltd., M. Clapp, Pres., plans the construction of a plant.

Ont., Windsor — Fleetway Motors Ltd., is having plans prepared for the construction of a plant.